Transport in relation to social and economic development in Sierra Leone

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PREFACE

This thesis is primarily intended as a geographic study of transport in relation to social and economic change in a developing country. Its purpose is to point out, as far as possible, the inter-relationship between transport innovation and socio-economic development. Since the emphasis is on the inter-relationships, the discussion does not therefore concentrate on expanding these subjects per se. Economists may find the thesis of some interest, they should not however expect a great deal of economic sophistication in the discussion. Economic concepts have been introduced mainly in the belief that, rudimentary though these may be, they will surely influence geographers to ask more of the relevant economic questions in evaluating the role of transport in developing countries.

I am deeply grateful for the financial assistance received from the Sierra Leone Development Company Ltd. in the form of a national scholarship for the first year of my research; to Fourah Bay College, (University of Sierra Leone) for providing me with funds to undertake various field work projects; and to the Institute of African Studies, Fourah Bay College, for considerable financial assistance in several aspects of my work. Appreciati credit goes to ITALCONSULT (Rome), a team of Transportation Consultants commissioned by the International Bank for Reconstruction and Development to study the transport problems of Sierra Leone, who gave me the opportunity of working for six weeks with a wide range of specialists in the various fields of transport, agricultural economics, soil science and statistics.

I would particularly like to express my sincere appreciation to two

people without whose constant help and advice it would have been extremely difficult, if not impossible, to complete this study. My thanks go to Dr. J.I. Clarke, formerly Professor of Geography at Fourah Bay College, now Reader in Geography, Durham University, for directing and stimulating my first uncertain steps in research work and to J.C. Dewdney, Professor of Geography at Fourah Bay College, who painstakingly read and commented on all the chapters. Further I would like to thank Dr. P.K. Mitchell, formerly Senior Lecturer in the Department of Geography, Fourah Bay College, now at the Centre for West African Studies, Birmingham, for valuable assistance in preparing the Road Map (Fig. 6.1) and for the use of his map on Early Trade Routes of Sierra Leone (Fig. 3.2), to Dr. M.E. Harvey, Lecturer in Geography at Fourah Bay College for valuable suggestions and objective criticism, Mr. G.J. Williams, Lecturer in Geography at Fourah Bay College, for permission to use his Amplitude of Relief map in the preparation of Fig. 7.3, to Michael Crowder, Director of the Institute of African Studies at Fourah Bay College, for his unfailing assistance in virtually all aspects of my work, to John Nelson and A.J. Elba for their help in the preparation of some of the maps, and to Mrs. Faulkner for typing the draft. The thoughtful comments of several others not mentioned here are also acknowledged. The responsibility for omissions and errors is, of course, entirely mine.

The analytical work is based largely on data collected from the various government ministries (now known as Departments under the military government); some, however, would have been difficult to obtain

without the assistance of commercial firms like U.A.C. Motors Ltd., Brewo Motors, British Petroleum Ltd. and public corporations like the Port Authority, Sierra Leone Produce Marketing Board, Sierra Leone Railway and Road Transport Corporation. Further, the help received from the Police in giving me free access to the motor vehicle files and the informative discussions held with officials of the Motor Drivers Union, are well appreciated.

In the thesis, the leone (the present unit of decimal currency) and the pound sterling, have been used. The sterling equivalent of one leone is ten shillings.

Conversion Table

1 cent	= 1d. approximately
5 cents	= 6d.
10 cents	= 1/-
100 cents (Le 1)	= 10/-
Le 2	= £1

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CHAPTER 1

INTRODUCTION

Over the past decade, the subject of transport and communications as a factor in the development of African territories, has been of vital concern to the former colonial powers, to the national governments which have replaced them and to the specialized agencies of the United Nations. The concern with transport goes back to the early days of the colonial period since, as Harrison Church has pointed out "the provision of transport is not only a basic feature of colonization but also one of its most obvious expressions".[1]

Data on transport, as in the case with so many topics of research in developing countries, are by no means adequate and are generally restricted to such relatively simple matters as route mileage, railway income and expenditure and port import and export tonnages. The paucity of data will be emphasized again and again because it is such a pervasive phenomenon in research work. This handicap, however, must not deter the pursuit of research nor should it prevent the formulation of conclusions. The author of this thesis has frequently utilized the limited data available to present bold ideas, believing that what may be considered unjustified anticipation and speculative conclusions, are inevitable research hazards in the interpretation of interrelationship in developing countries.

In the past, few transport studies have attempted to describe a transport system as an integral part of an African territory, that is to show the place of transport within the complex fabric of economic and social patterns within a territorial unit. The present thesis, therefore,

attempts to study transport as one element in the process of economic and social development in a specific territorial unit, Sierra Leone, which gained its independence from Britain on April 27th, 1961. The whole range of interrelationships is viewed from the viewpoint of the economic geographer.

The thesis discusses transport in Sierra Leone in a number of ways. It begins with a consideration of the transport system as manifested in its component parts. These include the least specialized forms such as small boat and coastal water movement, the less specialized forms of road transport including municipal and long distance passenger and freight movement by public and contract services and lastly, the highly specialized forms such as mineral railways and air services. The several chapters further identify three major phases of transport development in Sierra Leone: 1) the period from the early Portuguese contacts to the beginning of the 20th Century when patterns which had persisted for 300 years were finally broken down; 2) the period 1900 - 1930, when the railway provided the first penetration of mechanized transport into the interior and became dominant in the movement of goods and passengers; and 3) the period from 1930 to the present when road transport expanded enormously to become the country's primary transport mode.

In the analysis, chapters 1 - 2 treat the broad implications of the topic with emphasis on transport in relation to general development in the West African region. The thesis progresses from chapters 3 to 9 which give a detailed study of the various transport modes in Sierra Leone with stress on future development trends. Finally chapters 10 to 14

deal with social and economic development as a factor of transport in terms of motor vehicles, traffic, costs, rates and charges. The conclusion, deviating from the common practice of summarizing what has already been said, breaks new ground and attempts at presenting an idealized model of transport network evolution and discussing a few more relevant problems.

Development of Transport

As stated earlier, the transport system of Sierra Leone has evolved through several stages and the major motivating factor in the entire development process has been the economic need to link areas of potential production to world markets, and in reverse, to open up domestic markets to the industrial products of metropolitan powers. Here is seen a classic example of Ullman's concept of "complementarity", which expresses the exchange of commodities between geographically dissimilar regions as a function both of natural and cultural differentiation based on economies of scale[2]. In the early days of European contact, head porterage and canoes were the principal modes of transport. This form of transport was utterly inadequate to meet the needs of large-scale transfers, since the average load and day's length of journey for each head porter were usually in the region of sixty pounds and fifteen miles respectively. However, towards the close of the 19th Century, the 1885 Treaty of Berlin confirmed several European nations in their titles to diverse African territories, with the stipulation that these territories were to show effective signs of colonial occupancy. This provision was a vital factor in the development of the railway network

of Africa as a whole, which came to consist of a series of disconnected systems each confined to a particular colonial territory[3].

The growth of bulk transport inSierra Leone was started by the narrow-gauge government railway (SLGR), originating from the coast at Freetown and making its way slowly into the interior to terminate at Pendembu on the main line and at Kamabai[4] on the branch line. The railway thus accomplished much of the linking process and brought about substantial growth in external and internal trade. During this phase of railway development, the role of roads changed from that of a primary transport facility to a railway feeder. In this capacity roads expanded to link areas not accessible to the railway and thus complemented the railway's function in the development of trade. The mechanical revolution of the internal combustion engine, which made the lorry a cheap and practical transport mode, marked a turning point in the functional relationship between roads and the railway. The rapid growth of motor transport quickly raised roads to a competitive position vis-à-vis the railway as they reverted to their former role as a primary transport facility.

Throughout these stages of transport development, several interrelated themes are woven. The growth and decline of population and trade centres as the structure of the transport system changed are processes that can be followed throughout these periods. The decline of water transport and the rise of the railway are reflected in the decay of coastal trading

centres such as Magbile, Mano Salija, Sulima and Bonthe and the rapid growth of inland railheads such as Bo, Kenema and Segbwema. The effect of transport reorientation is not simply limited to the physical means involved, but also finds expression in such socio-economic phenomena as the development of urban and trade centres. Change in population and settlement distribution are other discernible trends because population near a motor road tended to increase rapidly, partly as a result of the coming of the roads and partly because whole villages migrated from their old locations to settle astride the new main roads. Further aspects of demographic and commercial redistribution are the rapid growth of new urban centres and the tendency, particularly marked since 1950, for commercial houses, especially Lebanese, to move further and further away from the railhead as that transport mode declines and to conglomerate in the immediate neighbourhood of lorry parks, which have today become the foci for transport in each major town[5].

The tendency towards a rapid growth of urban centres is paralleled by the trend towards port concentration, as changing route patterns expand the hinterlands of certain ports at the expense of others. A final theme is the continuous process of reducing economic distance by improvement in the transport system and by technical innovations. The real problem of economic development in Sierra Leone revolves around the central theme of effectively linking producers and consumers by reducing transport costs. Markets grow because of improvement in transport and communication. The market is originally small and localised.

Demand is often restricted by the cost of obtaining goods from the point of production, and supply is limited by the cost of moving goods into areas of consumption. The problem becomes most severe when ignorance prevails among producers and consumers as to market conditions. With improved transport, however, markets grow and the expansion is cumulative. Increased outlets for commodities produce an increase in real incomes which in turn raises the demand for other products. The linkage of markets by, and improvement in transport, becomes part of the development process. This linkage, forged by the combined innovations of rail and road since 1900, have given Sierra Leone a fairly well developed transport sector of the economy.

Geographical Background

Transport is a vital factor in economic improvement, and to understand its full implications, one must not only take into account the geographical realities involved, but must also be able to appraise the entire situation in terms of its geographical unity. This section thus attempts to familiarize the reader with the geography of the country, emphasizing mainly the more salient physical and human features as they are related to, and provide the setting for, transport development.

Sierra Leone has a total area of 27,925 square miles (approximately that of Scotland) and contains a population of 2,180,355 according to the first national census of 1963. Three zones of high population density clearly stand out: the Western Area whose high density results mainly from the presence of the Freetown area which provides the biggest

employment centre in the country and is continually attracting in-migrants from the provinces; a North-Western high density zone largely confined to the Port Loko and Kambia Districts where a combination of intensive rice farming, market gardening, fishing and mining have produced the high density pattern and lastly, an eastern belt in the Bo, Kenema, Kailahun and central Kono Districts where factors such as extensive cash crop farming, diamond mining and rapid urban growth, have contributed to the high population density pattern.[6] All three zones have densities ranging between 100 and 250 per square mile. Areas of sparse population are seen in the north-east quadrant especially in Koinadugu District and in the swamplands of Moyamba, Bonthe and Pujehun Districts in the south. Population densities in these zones vary from less than 20 to 50 persons per square mile. This low density is mainly the result of an adverse geographic environment and outward migration. There is a general positive correlation between population density and the distribution of transport facilities; areas of high population density tend to have most transport facilities and the reverse is generally true.

About the beginning of this century, the country must have been more forested than the present vegetation pattern suggests. As stated by Harrison Church:

> "...the vegetation has been so affected by farmers that the once extensive areas of rain forest have now disappeared and there remain only islands of forest, the rest, owing to the degradation of shifting cultivation, has degenerated into areas of high bush, low bush and orchard bush"[7]

Primary forest was mainly restricted to the south while savanna woodland was found in the north. Today, however, the country is covered largely by farm bush and savanna woodland; along the coast is a narrow belt of mangrove swamps. Building rail and road facilities in the forest zone has always been more expensive than in the open savanna woodland area of the north, but this has not prevented the forested south from having a greater concentration of transport facilities. The forest area, because of a greater degree of commercialization, as exemplified by cash crop production, contains the bulk of railway mileage and the densest road patterns.

The eastern scarp, a striking physical feature, runs in a north-west/south-east direction and separates the western plains area from the eastern plateau. The scarp exerts a negative influence on the development of the transport system as seen in the paucity of through east-west routes. West of the scarp there is an extensive road network, but it terminates abruptly at the western face. The negative influence of physiographic factors is illustrated in Fig.7·3 where adverse relief and swamp conditions stand out prominently as major deterrents to the growth of the transport network especially roads.

A mean annual rainfall of at least 80 inches is experienced over the whole country with the exception of the extreme north where less than 80 inches of rainfall are registered. Rainfall variability is small, a 10 percent average variation is almost universal. However, it

is not the total annual rainfall that is important to transport; the intensity and amount of rain falling at any one time are most significant. Heavy rain storms falling at short duration can cause disastrous washouts on the numerous laterite roads. In the peak of the rainy season in July and August, flooding of roads is common and this tends to disrupt the smooth flow of traffic.

The Economy

Economic factors have played a much more important role than have physical features in shaping the lines of transport. The structure of the economy is largely a function of geographical factors such as climate, the distribution of natural resources and the important fact that Sierra Leone is largely a country of peasant producers. The last feature is the result of British colonial policy, which, in a bid to make the territory economically viable, encouraged the early introduction of a cash economy based on peasant production. Cash crop production mainly consists of palm produce, cocoa, coffee, piassava and ginger.

African peasant agriculture showed early signs of success and in 1928, nearly 98% of a total export income of Le.3.22 million (£1.61 million) came from agricultural products. The oil palm has always played the leading role and production is widespread, though the most important areas are located in the Scarcies rivers, along the branch railway line and in the south-east where the palm groves are densest[9].

In the past both palm kernels and palm oil were exported, but today the oil is used to meet the demand of a growing domestic market while the kernels are still largely for export. Unlike Indonesian production, the bulk of palm produce comes from wild plants not plantations; there are however a few pioneer palm plantations at Masanki, Mange Bureh, Sahn and Gangah of which only the first mentioned is at present in full production. The future trend points to the greater encouragement of plantations and the setting up of pioneer oil mills.

Cocoa cultivation was introduced in 1925 and the cocoa growing region lies in the forested south-east with areas of maximum production centred in Kenema, Segbwema and Pendembu where the dessicating effect of the dry season is less severe. Production is based on small peasant holdings, harvesting and processing the cocoa seeds is still done by slow hand methods. Coffee is a newcomer and production effectively dates from 1945. Like cocoa, its cultivation is largely restricted to the south-east and the coffee trees are similarly planted in areas of high forest. In the past both Robusta and Liberica coffee were produced, but today the emphasis is on Robusta which is used in the manufacture of instant coffee.

Piassava is a vegetable fibre obtained from the raphia palm which grows in swamp areas. Production is concentrated in the estuarine swamplands of Pujehun and Bonthe Districts[10]. It has been exported for the past 50 years and is used in the manufacture of brushes. Ginger which is economically marginal, was first exported in 1890 and production is centred mainly in the Moyamba District. Demand is unstable and production has consequently been quite limited.

The early development of the railway and road network can easily be explained in terms of providing bulk transport media for the effective exploitation of the country's agricultural resources. Hence a major motive in constructing the government railway, as overtly expressed by Governor Cardew, was to release the great economic potential of the eastern palm-bearing country. The present railway alignment is a true reflection of this need, since it effectively traverses the major palm regions. Roads developed to reinforce the railway's function and played an important part in the development of cocoa and coffee production. The strong positive correlation between main cash crop areas and the greater concentration of transport facilities is rooted in the early inter-relationship between transport availability and agricultural development.

Another line of economic activity has been mineral production. This started in the 1930s and new minerals are still being discovered and exploited in the 1960s. An interesting feature here is that mining operations have created very little transport development; a striking variation from the experience in Ghana where the development of the railway was largely in response to the needs of the mining industry, and it has even been suggested that the Tarkwa gold mines were "the father of the railway".[11] In Sierra Leone only the iron ore mines at Marampa created a mineral railway which is exclusively geared to meet the needs of the mines and does not affect the movement of local traffic in the area.

Diamonds are mined principally in the Kono District, and on a rather smaller scale in the Kenema and Bo Districts. Mining is alluvial and is

carried out by a private company, Sierra Leone Selection Trust (SLST) and by a large number of small-scale African miners. The first recorded export of diamonds, in 1931, brought an export income of Le 3,520, (£1,760). A disturbing feature in the diamond industry is large scale smuggling which came to light in 1952. The illegal flow of diamonds finds a ready and lucrative market in the neighbouring Liberian capital of Monrovia from where the diamonds go to Lebanon and a number of European countries. However, government measures to stamp out the illegal traffic and create better domestic buying agencies, have helped in arresting the smuggling trade[12] as seen in Table 1.1.

Haematite iron ore is mined at Marampa in the Port Loko District by the Sierra Leone Development Company (DELCO), a subsidiary of William Baird of Glasgow. The first shipment of ore left the mineral port of Pepel in September 1933 and was valued at Le 166,000 (£83,000). Mining is entirely open cast and highly mechanized. The ore has an iron content of 47% which is upgraded to 65% in concentrating mills to meet the high demands of the world market. Production per annum is in the region of 2,000,000 tons. The company at the moment faces severe competition from producers of higher grade ore, such as Liberia and Mauritania, and the problem of retaining their long established markets is becoming increasingly difficult.

TABLE 1.1 PRODUCTION AND EXPORT OF DIAMONDS 1955-1964

	Legal	Production (Carats)	Value of Exports (Leones)		
Year	S.L.S.T.	Small-scale mining	Total Legal	Smuggled	Total in £
1955	419,137	-	2,800,956	16,000,000	19,000,000
1956	427,197	126,968	6,914,770	20,000,000	27,000,000
1957	506,198	547,171	12,850,394	30,000,000	43,000,000
1958	648,042	781,424	14,367,574	30,000,000	44,000,000
1959	660,404	651,418	13,617,136	30,000,000	44,000,000
1960	693,569	1,215,617	32,946,546	very low	33,000,000
1961	888,977	1,406,302	31,938,560	2,000,000	34,000,000
1962	603,439	1,033,963	14,217,724	8,000,000	22,000,000
1963	748,818	639,487	32,327,342	8,000,000	40,000,000
1964	825,000	779,808	38,000,000	2,000,000	40,000,000

Source: P.K. Mitchell and K. Swindell: 1965

Unlike diamond mining, which has created little transport development, depending mainly on the already established government railway and short spurs of access roads to link producing areas with the panning plants and separator houses, iron ore mining has created a 52-mile mineral railway from the port of Pepel to the mine at Marampa. Transport of ore and mining equipment is its sole function and its 3ft. 6in. gauge is quite adequate. Constructing the line was far cheaper and easier than the S.L.G.R. and it has recently been substantially improved to cope with increasing production at the mine. The railway now carries an annual average of over 2 million tons of ore using twin diesel engines and hopper wagons; 8 trains run per day. The line is closely tied with the

mines and its span of life depends on the continued viability of DELCO.

Bauxite and rutile are recent additions to the mining industry. Production of bauxite started in 1963 by the Sierra Leone Ore and Metal Company (SIEROMO) at the Mokanji Hills mine in the Moyamba District. In 1965 the export tonnage stood at 173,000 compared with 10,000 in 1963. The ore is first sent to Italy for reduction to alumina and later to Switzerland for refining. The rutile mine was opened in 1965 at Mobimbi in the Banta chiefdom of Bonthe District. Production started in 1967 by a private company, Sherbro Minerals Ltd., a subsidiary of several Anglo-American firms with considerable interests in titanium. Both the bauxite and rutile mines depend on a short access road to move the ores from the point of production to the export port of Niti on the Gbangbaia creek. From here lighters take the ore down the creek to ships anchored in the Sherbro river.

In summary, the export economy reveals two distinct features: an agricultural sector composed of small-scale peasant farmers producing cash crops and a wide variety of subsistence foodcrops, and a mining sector composed of almost entirely foreign concerns. Agricultural production has been on the decline both in volume and value as can be seen in the decrease of the palm kernel tonnage from 71,300 to 49,274 or in the decline of the rice tonnage from an estimated 630,000 to about 200,000 tons in 1950 and 1965 respectively. On the other hand, mineral production has shown a phenomenal increase and this trend is likely to continue for several years to come. The pattern is best illustrated in Table 1.2 where the Annual Export Income is broken down to percentages by major commodities.

TABLE 1.2 ANNUAL EXPORT INCOME - PERCENTAGE DISTRIBUTION BY MAJOR COMMODITIES 1950 - 1965

Year	Total in Le.m.	Percentage by Commodities					Total Percentage	
		Diamonds	Iron Ore	Bauxite	Palm Kernels	Others[13]	Mining	Agriculture
1950	13.32	23.36	19.16	-	34.19	23.29	42.52	57.48
1951	19.70	13.92	16.03	-	46.17	23.88	29.95	70.05
1952	20.90	12.65	21.34	-	49.67	16.34	33.99	66.01
1953	23.48	10.21	37.02	-	36.29	16.48	47.23	52.77
1954	22.00	15.45	24.61	-	34.22	25.72	40.06	59.94
1955	19.86	14.10	37.36	-	25.27	23.27	51.46	48.54
1956	24.26	28.50	33.00	-	20.67	17.83	61.50	38.50
1957	30.02	42.81	29.19	-	15.02	12.98	72.00	28.00
1958	33.08	43.43	27.15	-	14.80	14.62	70.58	29.42
1959	32.80	41.52	24.98	-	19.36	14.14	66.50	33.50
1960	51.86	63.54	15.95	-	11.25	9.26	79.49	20.51
1961	50.90	63.45	18.57	-	9.69	8.29	82.02	17.98
1962	33.30	42.70	30.73	-	14.73	11.84	73.43	26.57
1963	50.88	63.54	19.41	-	9.64	7.41	82.95	17.05
1964	60.88	65.42	17.14	-	8.00	9.44	82.56	17.44
1965	57.54	64.23	18.93	1.00	9.87	5.07	84.16	15.84

Sources: (1) Annual Trade Reports.

(2) Quaterly Statistical Bulletin Vol. 6 June 1966.

Salient points to be noticed are the general dominance of minerals in the export economy, producing a total income of Le 48,434,000 (£24,217,000) in 1965. Further the relative decline of iron ore export income compared with diamonds is significant. In the agricultural sector palm kernels have shown an absolute decline, at one time they accounted for 90% of the country's exports by value but in 1965, only produced a meagre 9.87%.

In the industrial field, manufacturing and processing occupy a small but growing sector of the economy. Government itself is active in the establishment and running of such industries as rice and palm oil mills, furniture mills at Kenema, and in association with foreign capitalists, has established cement works, flour milling and petroleum refining. The role of government as in other West African countries, is to transplant and diffuse modern production techniques which are necessary for industrialization but which cannot be easily supplied by private capital. The situation is quite similar to Japan's take-off period in industrialization.[14] Private capital is also independently playing an active role in the industrial sector, as seen in the production of consumer goods such as cigarettes, beer, paint, soap, mineral waters and a variety of food products. The gross product of manufacturing industries in 1964 was Le 14.14 million.[15]

Sierra Leone is a relatively poor country and it is essential to emphasize this when discussing the provision of expensive facilities like roads, railways and air services. The National Income per head of population averages about Le 90 (£45) although little significance can be attributed to such an average figure in a society where the subsistence

income is so important and yet so difficult to quantify. Further the country is suffering from a continuous adverse balance of trade, though deficit varies substantially from year to year as can be seen in Table 1.3.

TABLE 1.3 EXTERNAL TRADE: 1956 - 1965 (in Thousand Leones)

Year	Imports	Exports	Balance
1956	46,186	26,360	- 19,826
1957	56,500	36,692	- 19,808
1958	47,806	39,226	- 8,580
1959	47,040	38,938	- 8,102
1960	52,684	53,262	+ 578
1961	65,078	58,736	- 6,342
1962	60,972	41,150	- 19,822
1963	59,710	57,886	- 1,824
1964	71,019	67,965	- 3,054
1965	76,875	63,224	- 13,651

Source: J.I. Clarke et al: 1966

Quarterly Statistical Bulletin Volume 6, 1966

Such a bad visible balance of trade coupled with a national public debt of Le 65 million in 1967 as revealed by the National Reformation Council (NRC) which took over the affairs of government on March 23, 1967,[16] raises severe problems as to the country's ability to finance transport projects or raise foreign loans for such purposes.

Transport and Development

The foregoing discussion points to the important fact that the economic and social patterns of Sierra Leone are largely the creation of transport facilities which linked the country with the outside world. Since transport is of such strategic importance to development, it is essential to review a few of the significant themes.

Usually there are two dimensions to transport: geographic space and time. Better transport facilitates the cheap movement of goods through geographic space from point of production to point of consumption with the dual effect of maximizing markets and the inherent possibilities of economic growth. In the time dimension, better transport encourages economies of scale because of a more rapid turn-over in invested capital. The ideal situation results when reductions in costs are achieved in both dimensions simultaneously. This is best illustrated in rail transport which compromises effectively between slow but cheap water transport and fast but expensive air transport. Roads may reap similar benefits but only by the use of larger amounts of capital equipment at comparatively higher costs. The saving of capital achieved by transport improvement enables investment to be carried out in other fields, and this is important in developing countries where capital is usually the scarcest factor in

development. The saving in capital provides the major link between economic development and transport improvement. Economic growth solidly depends upon the growth of capital and transport improvement tends to release working capital which can then be made productive as fixed capital in other sectors of the economy. But before fixed capital can be used in other economic activities, there must be an adequate productive opportunity. Such opportunities will be related to the wider markets achieved by lower transport costs through savings in the space dimension and the lower costs of carriage reducing the economic gap between producer and consumer. The overall effect is to increase the market area by lowering the selling price of goods and consequently increasing the number of consumers. Hence producers will now be able to sell over a wider geographical area and also sell more within their original markets producing extensive and intensive economies.

In conclusion, it is essential to clarify the relationship between transport and the process of development and growth. The mere provision of transport media is not of itself sufficient to generate development; it is the efficient combination of transport and other factors of production like raw materials, population, energy resources, water supply etc. that will create economic and social development. With the availability of natural resources in economic quantities, transport then becomes a key factor and development may take place, if natural resources are lacking, then it is almost certain that no useful development will occur. The ideal situation in the interrelationship is the supply of transport facilities which are not wasteful of limited capital resources and at the same time adequate enough to promote economic growth and social development.

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13. In Table 1.2, the agricultural sector is divided into two groups only: (a) palm kernels (b) others. This is because palm kernel values dictate the trend in agricultural export income; cocoa, coffee and piassava are minor and contribute individually an average of 4% of the total export value per annum.

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CHAPTER 2

TRANSPORTATION IN RELATION TO ECONOMIC AND SOCIAL DEVELOPMENT IN WEST AFRICA

General Considerations

A geographical study of transportation in relation to the economy and society of a West African country, in this case Sierra Leone, must of necessity include a general treatment of West Africa as a whole. Having reviewed the problem in a broad West African context, a more detailed study of the topic can subsequently be undertaken with regard to Sierra Leone itself. Such an approach will facilitate comparisons in the various aspects of Transport Geography between Sierra Leone and other West African countries. Some of the basic patterns of transportation systems, the factors influencing their development, and their effect on the economy and society of West Africa, also hold true for Sierra Leone, because the countries forming the West African region have many geographical similarities in terms of relief, climate, population distribution and economic activities. Further, because of the fairly similar colonial policies that operated in the development of the individual states, transportation systems, especially the railways, follow the same broad pattern everywhere.

Improved means of transport are without doubt a necessary prerequisite to all types of social and economic development; and their general inadequacy has been one of the main obstacles to such development in West Africa. Since this section emphasizes transport in relation to economic development, the sociological, political and military aspects

will not be given prominent treatment here. However, the latter are of definite significance in West Africa where the existing transport systems often originated with military, political or administrative rather than economic motives. Economic development in this section is accorded a broader meaning; it involves not only industrialization, but also includes the important role of transport in developing internal markets.

A general survey of transport in West Africa will reveal the following broad patterns:-

(1) Hardly anywhere in West Africa is there a fully integrated transport complex allowing a rational choice of either rail, road, water or air transport as obtains in developed regions like Europe. This fact severely affects the movement of goods in the domestic markets, for in developing the various modes of transport, the predominating need was to cater for foreign trade in what was then a preponderantly mercantile economy. Hence the movement of goods was mainly possible between ports and their economic hinterland. For areas outside these, movement of goods was severely restricted until recent times when greater emphasis was directed toward road development.

(2) No country in West Africa has adequate transport facilities to meet the effective national demand. The inadequacy varies from country to country; the better transport facilities of the Ivory Coast for example, contrast markedly with the limited facilities of Upper Volta. Also there is a regional variation within the same state; the denser and more integrated transport network of southern Ghana stands in distinct contrast

with the less developed network of northern Ghana.

(3) The striking scarcity of good international links between the various states coupled with very devious routes are features that reduce the efficiency of transport in West Africa.

(4) A study of transportation in most of West Africa will largely involve the problem of bottle-necks due to the lack of sufficient goods and passenger services. This can be attributed, especially in the case of railways, to defective infrastructures, shortage of suitable equipment, faulty routings and other similar factors. Much effort is being made to alleviate this obstacle, but one wonders if it can be completely eradicated since one of its causes is inherent in such basic constraints on West African trade and production, as seasonal variation in freight volume. To increase transport capacity to meet the peak period of demand is to create also a corresponding excess and unproductive capacity in the periods of low demand.

(5) One of the principal factors affecting transport, especially road transport, is the state of maintenance and repair services. The inadequate supply of skilled workmen, equipment and organisation not only raises the cost of transport services to the consumers, but also induces a high replacement rate for vehicles. So acute is this situation in the Republic of Guinea, that vehicles, broken-down and abandoned, often present a picture of stationary rather than moving traffic.

Factors influencing Transport Development

Certain geographical, political and social factors have played an important role in the evolution of the transportation systems. The following section is devoted to a general appraisal of such factors, and their effect on the transportation networks in relation to economic and social development in West Africa.

Natural factors in the past imposed severe obstacles to transport development but today, with greater technological skill, such factors are surmountable wherever there is a real need for transport development. The geographical fact that West Africa, like the rest of the continent, is a plateau region with a narrow coastal plain from which rise steep slopes, makes the construction of railways and roads difficult and expensive. Consequent to this topographical difficulty is the fact that many streams descend the plateau over rapids and falls to reach the ocean. This physical difficulty is well demonstrated in the construction and alignment of railways in Sierra Leone, par excellence, where the 310-mile long government railway, with its sharp curvature and steep gradients, was opened in stages between 1899 and 1916. Added to these problems is the scarcity of sufficient ballast material and, except in Nigeria, the general absence of local fuel. Some difficulties have now partially been overcome by dieselization which was first introduced in the Dakar - Niger railway. In short, the topography of the West African region is inimical to easy transport development.

Climate and vegetational factors affect the development of transport in various ways. The problem is further complicated by the fact that since most of the transport routes have a north-south alignment, they traverse the entire range of climatic and vegetational zones, to whose vagaries and stresses they are subjected. The tropical forest zone, with its high annual rainfall of over 150 inches, presents a formidable obstacle to overland communications. Hence in pre-colonial days, there was little social and economic contact between the populations of the forest and those of the savanna zone. The railways, after colossal efforts and sacrifice both in men and money, broke this isolation, and imprinted an indelible mark in the political, social and economic landscape of West Africa. In the forest zone, too, maintenance of laterite roads with a heavy traffic volume is difficult and expensive; asphalting seems to be the only reliable solution.

In the savanna zone, the seasonality of the rains also presents problems. In the wet season, rainfall is intense and torrential, flooding of roads is a common feature and their subsequent impassability a problem that affects the flow of traffic. In the dry season, laterite roads loose their moisture content and become dust bowls filled with corrugations. These not only cause wear and tear to vehicles but also create conditions in which accidents are very likely. Both factors cause a high vehicle replacement rate.

River traffic, so dependent on the water level, is even more hampered by rainfall regimes. The extreme fluctuation in water level between the rainy and dry seasons makes most West African rivers of little importance

in the regular movement of passengers and freight. Traffic on rivers follows a rhythmic seasonal pattern to avoid periods of low water level; hence river craft are only effectively used for a limited period in the year. This is a severe hindrance to the economic development of areas mainly served by river transport. When attempts are made to utilize the rivers despite water level fluctuations, several river craft of varying draft come into operation which not only cause a frequent and wasteful break of bulk, but also involve severe damage and loss of property. This fact may explain why the Niger has not developed as the main north-south communication artery in Nigeria; instead the Kano-Lagos railway performs that function.

Agricultural and mineral production for export have to an important degree influenced the development of communication patterns. This is seen much more in Ghana where the western railway from Sekondi to Kumasi, built between 1901 and 1903, had its original impetus from mining concerns like the Ashanti Goldfields Corporation. The eastern railway from Accra, built in stages from 1909 and completed to Kumasi in 1929, was primarily intended for the transportation of cocoa to the ports of export. More recently, the need to exploit the large deposits of high quality iron ore at Mount Nimba in Liberia, precipitated the construction of the 200-mile remote control mineral railway from Buchanan on the coast to Mount Nimba. The Fria mineral railway in Guinea is another case in point.

From the sociological point of view, the demographic pattern of West Africa is a basic factor governing transport development. Areas of high population density usually have a high transport network density, and this correlation comes out clearly in the densely populated coastal regions. There has also been a redistribution of population consequent on the development of transport services. From low-income areas with a high population density, labour migrates for varying periods to higher-income areas which are mainly in the south. Such a labour flux obtains in the main groundnut producing areas of the savanna where "navetanes" or casual labourers, migrate from the poorer areas of Mali and Guinea to work as harvest labourers in the groundnut farms of Senegal and the Gambia. About 350-400,000 migrants, mainly from the Mossi country of Upper Volta, are in Ghana working in the mines and cocoa farms.[1]

Communications have been the greatest factor in the evolution of towns in the past and the present rapid urbanization of coastal regions. Many towns grew up on trade routes, Kano, for example, because of its dual role as caravan halt and transfer point where goods were transloaded from camels to donkeys or human porters, became a large commercial centre. In recent times, the development of the import-export trade, facilitated by railways and roads, has led to great urban concentrations especially along the coast.

Political Factors

Apart from a few exceptions like the traditional caravan routes, the evolution of transport routes largely reflects political divisions. A salient point here is that natural geographical frontiers are not

coterminous with political frontiers, hence political units do not usually coincide with natural or economic regions. After the Berlin Conference of 1885 established that effective occupation of a territory was tantamount to that territory being recognized as a colony of the occupying power, railways were built to prove effective occupation and the farthest point reached by the railway, often reflected the limit of military penetration and political control. Hence in many cases, railways were established not to meet a real economic need as happened in Europe, but to satisfy a politico-geographical motive. Perhaps in this single fact may be discerned one of the main reasons why most railways in West Africa today are uneconomic. The new political frontiers paid hardly any attention to the maintenance of ethnic units or natural markets with their traditional trade routes. This disruption, apart from its social effects as exemplified in the division of the coastal Kroo tribe between Sierra Leone and Liberia, has led to longer and more circuitous routes; a consequence of attempts to make transport networks fit in with the new political frontiers.

The policy of restricting communications to the national territory in order to create a national instead of an international transport system, has led to the development of transport routes with insufficient economic justification. Thus the lower Niger, whose natural economic hinterland includes the region comprising Mali, Niger and North Cameroon, and which is consequently the natural outlet for these territories, was

not used as such; instead all traffic was directed to distant Dakar. Such a circuitous route raises the real cost of transport and consequently affects the retail price of imported goods. However, recent political developments stressing economic cooperation among the various states, are likely to change some of the conditions resulting from former political divisions. Integration of transport networks and creation of good international road links with the infilling of gaps should be accorded high priority. In short, the creation of a truly international transport system to meet the immediate and future economic and social needs, is imperative for socio-economic development beyond the narrow confines of national frontiers.

Economic Factors

Although the preceding section has stressed the point that there is hardly any correlation between political units and natural economic regions, the various economic structures of West African countries exhibit definite similarity as regards productive activities. In most cases the agricultural economy is an unsophisticated type centred on the village, production being geared mainly to meet the basic needs of home consumption. Thus producing and consuming areas are generally in close juxtaposition. Hence, despite the lack of sufficient statistical data to support the statement, it can be assumed that the value of locally produced and consumed foodstuffs far exceeds that of export crops.

Consequently, movement of goods in West Africa, except over very short distances, mainly involves export commodities for which purpose the

communication network was primarily designed. The exchange of goods between production zones is still in its infancy, except perhaps for the traditional southward movement of cattle and northward movement of kola nuts. Even here, mechanized transport is still little used, for cattle frequently move on the hoof. The demand of West African industries for transport services is still slight owing to both the low level of industrialization and the location of industries. Most industries are situated either in ports, palm oil producing factories being a case in point as their products are mainly exported, or in the principal urban centres that provide the largest and best markets for locally manufactured goods. Transport is mainly characterized by the bulk haulage of heavy, low-grade commodities like cocoa, groundnuts and mineral ores. The transport modes best suited to this traffic are the railways and, wherever possible, inland water transport.

In the post-war years there have occurred some very important changes, both qualitative and quantitative, especially in the rapid adaption of transport to the general needs of post-war economic development. Apart from the great increase of transport activities, particularly at ports, and the systematic modernization of railways in most, and tremendous expansion of road traffic, in all countries, there has also been a radical change in the relative proportions of imports and exports. Imports have increased in volume faster than exports; the former are also becoming progressively more diverse than the latter.

The general trend has been to import more consumer goods of a heterogeneous nature, when hitherto, producer goods dominated. Also the incipient stages of transport specialization, particularly in the form of vehicles catering exclusively for passengers or for goods, is a welcome feature of road services. The days of the pioneer "mammy wagon" with its miscellaneous load of people, goods and sometimes goats, are definitely coming to an end. All these changes conclusively point to a progressive rise in living standards, and a growing diversification of the general economy, advancing from the traditional subsistence level to the incipient stages of industrialization.

Demand for Transport Services

Transport as a form of production has its principal function in extending the market for the goods carried. In West Africa, the demand for transport services is a heterogeneous one, the product sought and supplied may be passenger/miles or ton/miles. The traditional distinction between passenger and freight transport is not as distinct in West Africa as in most developed countries. Although modern forms of transport are fairly common in West Africa, there still exists a certain demand for the traditional, unsophisticated modes of transport, which may be due not to a simple lack of more modern facilities, but to the fact that under the present stage of economic development, the primitive mode of transport preferred, though technically inefficient, is not economically so.

The railways were the first modern form of transport developed and the main economic reason for their introduction was to serve the export not the import trade. With primary export production the freight offered is often of a homogeneous nature and rates charged are quite competitive. But transport serving the domestic market is mainly characterised by "mixed traffic"; this is due to the low level of capitalization in internal commerce and the consequent result of trading in small quantities of goods. Hence the breaking of bulk assumes great importance, and any mode of transport catering for this market has to cope with a demand for the movement of heterogeneous freight in small quantities. In short, there is a real demand for a combination of passenger/miles and ton/miles. This is even the case for railways, but it is much more so for roads and inland water transport, where most vehicles carry passengers and goods and only a very small proportion specialize in either passenger or goods traffic.

Unsophisticated Forms of Transport ✓

Such forms of transport still exist in remote parts of West Africa; human porterage with all its uneconomical implications in terms of very high rates per unit of freight, may still be the only form of transport available. Although human porterage may at times involve the movement of cash crops, its main use is in retail trade where the trader himself does the carrying of goods. The economic aspects involved in such retail trade employing head porterage can be simply expressed in the following terms.

In West Africa, there is a plentiful supply of labour, but capital is very scarce. Marketing methods are bound to differ from those of developed countries with an abundance of capital. Hence abundant labour supply is sometimes utilized in head porterage to replace scarce capital which would have been used to meet freight charges. This transport mode is thus justifiable, but the movement of cattle on the hoof, a practice so widespread in West Africa, is rather difficult to accept. Apart from the losses that occur, the cattle, worse still, lose a substantial amount of weight and this reduces the price of the animal when slaughtered. There is a large and unsatisfied demand for transport of cattle both by rail and road, which cannot easily be met by flying frozen meat from the area of production to that of consumption as has been tried in countries like Upper Volta and Ivory Coast.

Railways

These were the first modern mode of transport to penetrate West Africa, indeed the effective alternative to human porterage. Although the first railways were built for political rather than commercial reasons in the context of the colonization of Africa, their introduction, providing a means of transporting bulky commodities over long distance at a comparatively cheaper rate, stimulated cash crop production and mining activities, mainly for export purposes. Most products exported make typical railway freight - bulky goods of low unit value like palm kernels,

iron ore, bauxite, groundnuts, cocoa and cotton. Thus more goods are moved by rail than by any other means. The preponderance of railways is especially noticeable in the export - import traffic. In the recent past, about ¾ of this trade was carried by railways in former French West Africa and it is fairly common to find that in most of West Africa, ¾ of rail traffic concerns foreign trade while only ¼ concerns domestic trade.

Railways in West Africa comprise about 5,500 miles of track, of which 46% is in former French West Africa. The transport patterns of both former French and former British West Africa show many common features, for despite differences in population densities and exploitation of mineral resources, the territories generally export and import similar commodities. These similarities notwithstanding, the railways of former French West Africa and those of former British territories have developed in rather different ways. The transport pattern on the whole displays a greater degree of coordination in former French than in former British West Africa, because French possessions were far more of a continuous political unit than the British. The basic aim of the French administration was to link the navigable stretches of the Rivers Niger and Senegal by railways, so as to secure a through means of communication between the producing hinterlands and the exporting ports of the Atlantic Coast.

Because the possibility of remunerative traffic was remote and the need to build rapidly was dominant, the railways of French West Africa consisted mainly of light tracks following routes chosen for politico-geographical, rather than topographical or economic reasons. The hurried railway construction through insufficiently surveyed territory, together with the vital need to reduce costs, resulted in steep gradients, acute curvature and circuitous tracks. Thus, when the war brought a substantial increase in traffic, the railways were in no position to cope with the demand. The need for modernizing the railways became very obvious, and the post-war effort in railway improvement was mainly centred on renewal of installations and equipment, improvement of operations and extension of existing networks. The last however, has been severely limited by road transport competition. In the modernizing operations, dieselization has achieved great success, because diesel traction is more efficient, assures comparatively cheaper and more reliable services. Returns have however been very modest, mainly because productive resources have not been developed simultaneously.

Unlike former French West Africa where railways originally developed as a supplement to the Niger and Senegal river networks, those in the British territories were planned separately for each colony, with a greater emphasis on exploiting the main agricultural and mining areas and channeling their products to the ports. Although the Nigerian railway possesses the largest track mileage in West Africa (about 1800 miles), it is merely a skeleton system, for it lacks any east-west link in the south of the country. This railway, like most in West Africa, was also built

ahead of demand. The western line runs from Lagos through the cocoa growing region, to Kaduna and on to Kano, with branch lines to Kaura Namoda and Maiduguri. It hastened the commercial production of groundnut and the growth of the cotton industries, by providing a new outlet to the sea ports of the south. The eastern railway, running from Port Harcourt through Enugu to Jos, was intended to facilitate the tapping of tin resources in the Jos plateau and coal deposits of the Enugu coal seams. Like the other railways, the Nigerian railway could not cope with the increased traffic brought by the war; this situation deteriorated progressively to produce the often quoted groundnut bottle-neck at Kano, which was due mainly to shortage of motive power, rolling stock and inadequate maintenance. However, since 1953, the situation has been improved by the acquisition of diesel engines, the relaying of a substantial mileage of track and the transformation of the railway from a government department to a public corporation.

The Ghana railway, a compact, well managed and prosperous system, is the best example in West Africa of a railway built purely for economic reasons. This 591-mile railway, consists of a western line that runs from Takoradi to Kumasi and usually known as the "mineral line", since it was built mainly through the initiative of mining companies intent on exploiting the mineral resources of south-western Ghana. The eastern line runs from Accra, through the cocoa producing region to Kumasi. On the whole, rapid economic progress coupled with the development of heavy industries like aluminium smelting using power from the Volta river project, epitomize the bright future of Ghana's railway.[2]

The Sierra Leone railway is rather unusual. Extending for only 227½ miles eastwards from Freetown to Pendembu, with an 83 mile branch line from Bauya to Makeni and having a narrow gauge of 2ft. 6 ins., it is not in fact the principal freight carrier. Against its total of 64,000 tons in 1965, the private mineral railway of DELCO hauled about 2,000,000 tons of iron ore. Except for 1941-42, when it made Le 96,000 profit, the Sierra Leone railway has always operated at a vexing loss from 1899 to the present, and now it is the impotent victim of increasing road competition. In Sierra Leone, the usual defects of West African railways are seen in their accentuated form: devious routes, steep gradients, low capacity unable to meet increased traffic during the war, but above all, an ageing and unsuitable infra and super-structure to meet the demands of a developing nation.

In assessing the value of railways as a medium of development, one has to consider whether the supply of railways and ancillary services is sufficient to meet both the actual and latent demand. If railways ought to increase their capacity, it has to be decided whether the increase should be in extensions or merely in improving equipment and operating methods. On the question of railway extension, there is a school of thought whose contention is that the railway age is over and expansion must now be directed to the roads. From the point of view of transport in relation to socio-economic development, the above contention does not seem to be justified. Most railways in West Africa now have enough capacity to meet actual demand; this, however, definitely excludes the Sierra Leone railway where capacity is short of actual demand.[3]

However, there is good reason to believe that railway expansion in order to stimulate and hasten primary production and industrial development, is still an economic necessity. This is well exemplified in Nigeria where the recent extension of the railway to Maiduguri, facilitated by a £10 million loan from the International Bank, will now provide facilities for exploiting the agricultural resources of Bornu Province. Economic integration amoung the various sovereign states must of necessity involve railway extension if, as the four countries of the proposed "Free Trade Area" comprising Guinea, Sierra Leone, Liberia and Ivory Coast, have in mind, industrial complexes are to be created.

Roads and Road Transport

One important post-war feature in West African transport has been the rapid growth of motor traffic on the highways, a phenomenon reflected in increased road building. Unlike the railways, where governments are mainly responsible for their operation, the road transport industry largely falls in the private sector of the economy. The haulage business is conducted by small firms and individuals, because the demand for road services is diffused and there is as yet very little advantage to be gained from large scale operations. In former British West Africa, where most of the owners are Africans, the capital required to go into business comes largely from an unorganized and imperfect market for capital represented by the extended family and kinship group. Hence the ownership of commercial vehicles often tends to be collective, rather than individual.[4]

Road transport is characterised by mobility, flexibility, use of small transport units, adaptability to varying needs and frequency of services. These advantages have not only given it an immense competitive force, but have also made it a more effective medium in creating economic integration and expanding the domestic market. All these factors have led to the rapid development of the motor transport industry. Because West Africa is still relatively under-developed, the motor transport industry has not yet evolved into specialized sections; most of the vehicles are engaged in moving a wide variety of goods in conjunction with passengers.

A brief historical sketch of road development reveals that, in the pre-war period, road building lacked any comprehensive policy. Roads were largely dry-weather tracks frequently obstructed by slow and often unreliable ferries. The earliest roads were designed to act as feeders to the railway systems and to provide direct links between important urban centres as was the case in Nigeria. These earlier roads have today developed into the main trunk roads. Secondary and tertiary roads are later developments and mainly serve provincial and local needs, or, in the case of tertiary roads, act as feeders to the main trunk road system. In the post-war period, most countries embarked on a consistent road development policy with greater emphasis laid on improving the existing road network, especially the construction of bridges to replace the slow ferries that once plied the rivers. Much more recently, road development policy has been geared to the establishment of new road links and putting a tarmac surface on the major highways. At the moment of writing, road construction is still in the priority list of economic and social development

in most countries, with much attention given to first class roads that will link the various countries, and perhaps give an element of reality to the much discussed political and economic cooperation in West Africa.

The motorization of road transport has likewise proceeded rapidly but the increase has not led to a substantial rise in transport specialization. Heavy trucks are still not common and, most long distance traffic is carried in trucks of no more than 5-ton capacity whereas 12-ton diesel trucks would obviously be more economical. However, an encouraging trend is the growing proportion of passenger vehicles and vans in the total number of the vehicle population, pointing to the gradual displacement of "mixed transport".

Road transport has been one of the most striking features of post-war economic development in West Africa. Despite this impressive progress, it cannot be pretended that any West African country as yet possesses a viable highway system adequate to its needs. The short average life of vehicles, in particular commercial vehicles, is an indication of defective and sub-standard highway systems. In Nigeria, as in most parts of West Africa, the entire vehicle stock is replaced about every four years. The annual rate of increase of vehicles in West Africa is very high: 12% for Ghana and Nigeria, about 18% for Sierra Leone. There is an obvious need for a system of secondary roads to serve the domestic markets, but these, like trunk roads, must be constructed to higher standards so as to increase the life span of vehicles using them.

Present trends seem to indicate that, as the roads improve, traffic density rises and heavier vehicles appear, making road improvement a necessarily continuous process. With the general rise in road building costs resulting from greater mechanization and wage increases, however, limited finances may still lead to unsatisfactory road building standards.

Commercial Air Transport

Air transport is, in essence, a post-war development and being characterised by great speed, should be of immense importance in such a big region not only for maintaining links with the rest of the world, but also for serving the domestic transport needs. Furthermore, air services have the great technical advantage of not being seriously affected by changing weather conditions. Whereas road transport in particular and railways to a slight degree, are often interrupted by the rainy season, and river transport is partially immobilized in the dry season, air transport can continue to serve areas that would otherwise be cut off from the rest of the country. Thus air transport holds a great potential for West Africa but, at present, actual demand is severely restricted by cost. Initially, air transport was developed in the form of two big organizations with West African Airways serving the former British territories, and Union Aeromaritime de Transport (UAT), serving the Francophone territories. But with the attainment of independence by the various countries, West African Airways disintegrated into small high cost micro-air lines (with the possible exception of Nigeria and Ghana Airways), whose establishment was based more on national

prestige than on economic reason. This splintering process also took place in former French West Africa, resulting in the creation of small national air lines with Air Afrique being the only exception. If air transport had been allowed to continue in the former big units, large scale operations would have led to real financial profits and perhaps to much more efficient services, but the present proliferation of national air lines leads to an uneconomic duplication of services and surplus capacity. Air transport is very necessary to West Africa, but it is very capital intensive and as such, everything possible must be done to make it self-supporting instead of depending, as the air lines do at present, on government subsidy. Here is a unique situation where economic reasons demand regional cooperation and the creation of one or two big air lines, as in the past, to serve the entire region of West Africa.

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CHAPTER 3

INLAND WATER TRANSPORT

General Considerations

Freetown, the capital city, possesses the best natural harbour along the coast of West Africa. No other harbour has so large an area of safe anchorage or such ease of entrance for ships of any draft. Sierra Leone, however, is not correspondingly well endowed with inland waterways. There are no large and important rivers comparable to the Niger, Senegal, Volta or the Gambia which could rightly be considered major transport routes for the movement of goods or passengers in large quantities. All the inland waterways are comparatively small; nevertheless they carry an appreciable volume of traffic when high flows and tidal effects are satisfactory to navigation. Data on inland and coastal waterways traffic are either incomplete or non-existent. Even to arrive at reliable estimates is difficult since traffic is moved by private individual boat owners whose operations are neither scheduled nor recorded.

The rivers of Sierra Leone generally flow from the north-east to south-west to empty into the Atlantic Ocean (Fig. 3.1). Six out of the seven larger rivers have their watersheds outside Sierra Leone as can be seen in Table 3.1

TABLE 3.1 MAJOR RIVERS AND THEIR WATERSHED AREAS

River	Area of Watershed
Great Scarcies	900 sq. miles
Little Scarcies	4,970 " "
Rokel	4,100 " "
Taia or Jong	2,900 " "
Sewa	5,460 " "
*Moa	3,500 " "
Mano	810 " "

After Transportation Consultants 1963 Washington
* Major river with entire catchement area within Sierra Leone.

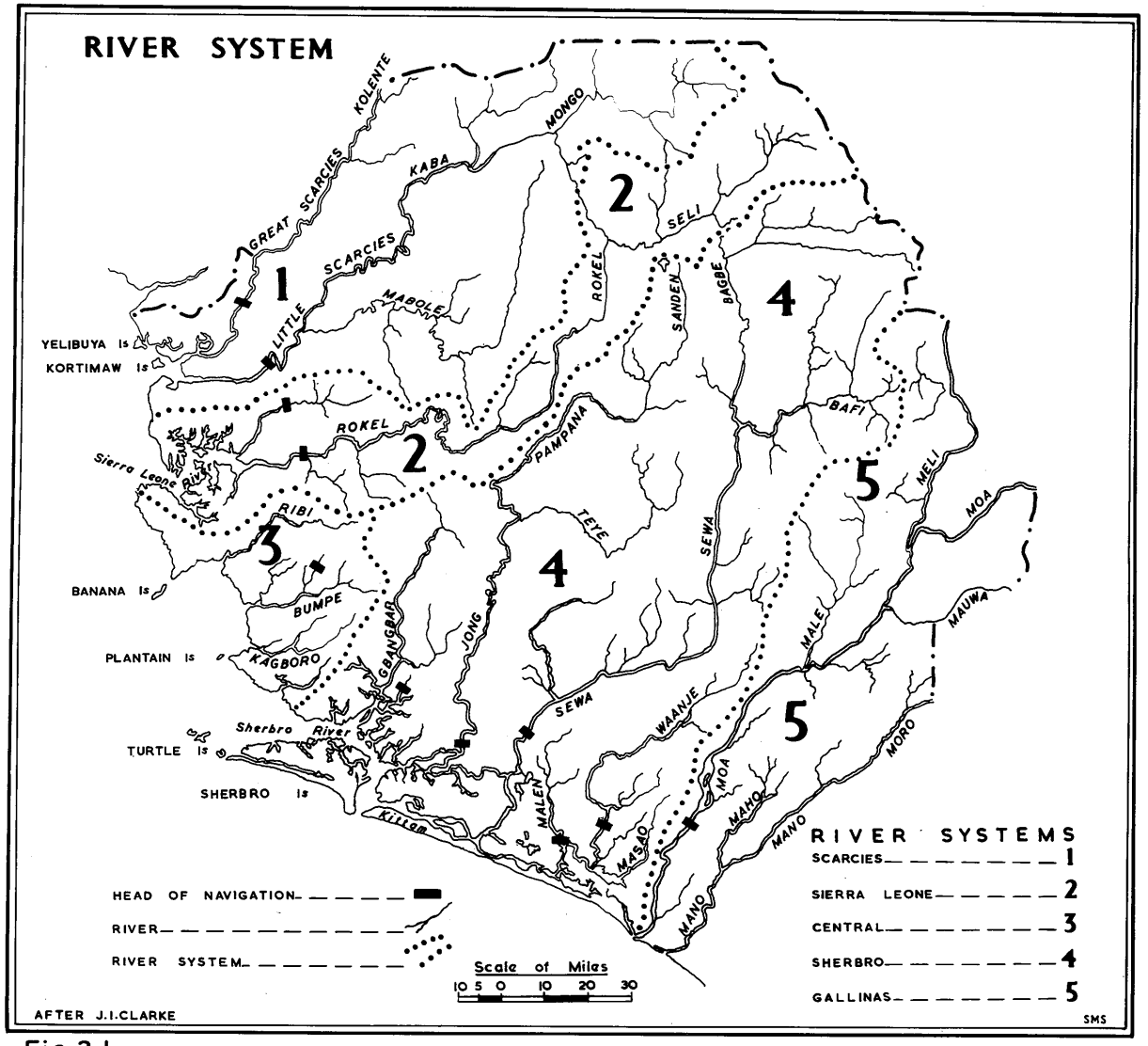
RIVER SYSTEM
KOLENTE
MONGO
GREAT SCARCIES
KABA
SCARCIES
LITTLE
MABOLE
ROKEL
SELI
SANDEN
BAGBE
YELIBUYA Is
KORTIMAW Is
ROKEL
PAMPANA
BAFI
Sierra Leone River
RIBI
TEYE
SEWA
MELI
MOA
BANANA Is
BUMPE
MAUWA
MALE
PLANTAIN Is
KAGBORO
GBANGBAR
JONG
SEWA
WAANJE
Sherbro River
TURTLE Is
MORO
SHERBRO Is
Kittam
MALEN
MASO
MOA
MAHO
MANO
MANO
1
2
3
4
5
HEAD OF NAVIGATION
RIVER
RIVER SYSTEM
Scale of Miles
10 5 0 10 20 30
RIVER SYSTEMS
SCARCIES 1
SIERRA LEONE 2
CENTRAL 3
SHERBRO 4
GALLINAS 5
AFTER J.I.CLARKE
SMS

Fig.3.1.

Inland and Coastal Waterways

Documentary evidence to show the volume of waterborne traffic and the extent of which use is made of the waterways, is extremely scanty. Observation, however, leaves little doubt as to the appreciable volume of such traffic and the potential for further development. Although there has been no accepted concensus of opinion as to the total mileage of waterways navigable by small boats - Cox-George estimates 680 miles[1] while a team of Transportation consultants down-grades this to 400 miles[2] - it is highly probable that the total length is in the region of 500 miles. Water transport has the attraction of cheapness compared to other modes and must therefore be given high priority in development plans, especially in areas like Bonthe District where government is concentrating mechanized rice cultivation. Further, many centres of population are nearer to one another by water than by road and this geographical fact would be of great advantage in the movement of freight and passengers if water transport were modernized.

An attempt will now be made to treat individual waterways starting from the north and moving progressively southward.

The Scarcies System:

This comprises two rivers: the Great Scarcies or Kolente which forms the north-west frontier with Guinea and the Little Scarcies or Kabba further south. The coastal channel from the mouth of the Sierra Leone River to the Scarcies estuary has navigational aids in the form of four bouys. Because of the bar at the entrance to this channel, navigation is restricted only to periods of high tide. Beyond the bar, there is

sufficient water depth in the Great Scarcies as far as the inland port of Kambia. Beyond Kambia, which is the head of navigation, there are a series of rocks in the river bed which impede movement further upstream. The distance from Freetown to Kambia by way of the Great Scarcies is 56 miles. With the help of the proper tide, all year round navigation is also possible on the Little Scarcies as far as Mange, the head of navigation. The distance from Freetown to this inland port is a mere 48 miles.

The Sierra Leone River System:

The Sierra Leone river provides the excellent deep-water harbour at Freetown into which the Port Loko creek and Rokel river flow. Part of this channel is frequently dredged by DELCO to enable their iron ore ships to sail as far as the mineral port of Pepel. Beyond this port, the channel is not dredged, but navigation using the right tide, is possible as far as Port Loko, a distance of 38 miles from Freetown on the Port Loko creek. On the Rokel, navigation is possible up to Magbile, a very important trading port in the 19th century.

The Central System:

Moving down the coast from Freetown, there are no important water-ways until the Sherbro river system is reached. The rivers of the Central system consist of the Ribi, Bumpe and Kagboro. They are small rivers subject to marked seasonal variations inwater level which severely restricts their usefulness as regular communication arteries. Although all three rivers may be navigable in their lower reaches, especially in the rainy season, there is, however, no evidence to suggest that any of

them carry a significant volume of waterborne traffic.

The Sherbro River System:

This provides the largest river system in Sierra Leone and consists of the Sherbro itself, the Bagru, the Tejo creek, the Jong, the Sewa, the Waanje and other smaller channels. An interesting feature of these rivers is that they are all linked up by intracoastal channels prominent among which is the Kittam. Ultimately they all empty into the Sherbro river and hence have a direct link with the port of Bonthe which is located on Sherbro island. The Sherbro river itself, until recent years, provided a deep channel to the port of Bonthe. Due to silt deposition and shifting sand as well as the general increase in the size of oceangoing vessels, ships can no longer anchor at the port of Bonthe but must anchor about 9 miles downstream and depend on lighters for loading and unloading. Unlike the Scarcies or Sierra Leone river systems, the Sherbro and its associated channels, especially south of Bonthe island, have very few coastal ports. This may be due to the straight and sand reefed coast backed by difficult tidal lands. This coastal characteristic imposes a severe limitation to the development of ports. Hence the great premium that was placed on the port of Bonthe in the early development of trade; for it served not only a wide hinterland but also an extensive coastal area where port development was then impossible. The total mileage of year-round navigable waterways in the Sherbro system is approximately 140 miles.

The Southern River System:

This system which comprises the Moa and Mano rivers, is not usually treated as a separate entity; it is normally integrated into the Sherbro river system. The reasons for doing this seem dubious. It is highly probable that previous writers like the American Transportation Consultants, have found it easier simply to merge the two systems into an all embracing Sherbro river system.[3] Detailed study of the Moa and Mano rivers reveals that these two, because of their peculiar characteristics, constitute a different river system from that of the Sherbro. Primarily both rivers do not link up with the port of Bonthe by intracoastal channels. They empty directly into the Atlantic Ocean and have coastal ports prominent among which is Sulima, once a flourishing and important commercial centre. Merchandise coming from the hinterland of these rivers did not usually go to Bonthe; instead it moved down to Sulima.

Early Development

It is extremely doubtful whether, prior to European contact with coastal Sierra Leone, river transport was of any great significance to the indigenous people. Movement of small craft up and down the navigable stretches of waterways involved only a limited amount of traffic and short distances serving restricted hinterlands. The technological backwardness of the society, with an economy fragmented into self-sufficient units, was neither conducive to regional specialization in production nor to the development of internal markets. Even though navigable rivers existed to handle large volumes of traffic, yet the lack of demand, due to the isolated nature of the economy, militated against their functioning as a

bulk transport medium. Such was the position of water transport when European traders first made contact with coastal Sierra Leone in the first decade of the 16th Century. Their presence opened new vistas of trade especially the exportation of slaves and local produce; it further exploited the African market for the sale of European manufactured goods. Trade at this stage was simply in the form of barter or in "iron bars" which later became a conventional unit of currency.[4] For the first time, river transport began to play a significant role in the economy.

As in Ghana and Nigeria, water transport was now pioneering the opening up of trade and commercial enterprise. From this period right on to the railway era of the early 20th century, waterways provided the only medium for bulk transportation. The early phase was characterized by a proliferation of small and scattered ports to which all the trade was channeled. These settlements, most of which existed or developed in the 19th century, were populated mainly by indigenous people around a European trading station or factory as they were commonly known. Many of the people served as middlemen in the commercial structure. Penetration lines, in the form of regularly-used tracks to the interior, were poorly developed and sometimes dangerous due to the activities of the "robber barons" of the interior. Because of the characteristics of the rivers, fall line towns, which formed heads of navigation, were commercially important. However, with the upper courses impeded by rapids, the rivers never developed as the main lines of thrust when effective British penetration into the hinterland began.

Despite the large number of ports, not all were significant nodal points for commerce. Among the coastal ports, Freetown, par excellence, held a dominant position, followed by Bonthe, Mano Salija and Sulima; while with the river ports, Magbile and Port Loko were most important. The remaining ports were functionally subservient to those just mentioned. Port facilities even in Freetown and Bonthe were inadequate; the crude wharves and jetties were insufficient to handle effectively the large volume of waterborne traffic and many boats had to load and unload from the river banks. This imposed a high rate of loss on freight and it was not uncommon for a boat, caught in a low tide, to settle firmly in the mud. Trade was not organized and the colonial government showed little interest in the development of water transport, hence the inefficient nature of the industry.

Before dealing with the various trade commodities of this early period, it is necessary to investigate the structure of the trade routes as shown in Fig. 3.2. There were two important highway types: the overland caravan route and the navigable waterway. Although the two should be regarded as a functionally integrated transport system, it cannot however be described as a network; for the trade routes hardly possessed any lateral connections.

In the 1890s, Governor Cardew, in his effort to find an economic rail route for Sierra Leone, delimited the following trade routes of the Protectorate:

1. "From Falaba by Bafodeya or Koindadugu through Kahrena or Bumban thence to Port Lokkoh.

2. From Matotoka, tapping the Kuniki and Sanda Lokko countries thence by road to Benkia on the Rokelle River where the produce is loaded in small canoes and transported to Magbile and thence transhipped in larger ones to Freetown.
3. From Mongeri through Senehun to Freetown.
4. From the Upper Mendi Districts to Mafweh, Pujehun and Bandasuma respectively, thence by waterways to Bonthe, Lavana Sulima and Mano Salija."[5]

The effect of these routes was to divide the country into geographically isolated regions with hardly any economic interrelationships. Each region's trade was usually restricted to its particular trade route. Commercial traffic showed little diversity; trade goods consisted mainly of slaves, gold, ivory and agricultural produce on the down traffic while European manufactured goods dominated the reverse flow towards the interior.

The primary impetus to the effective settling of the port areas and the increased utilization of water transport, was without doubt, the slave trade. The establishment of a European trading factory at any of the ports was usually the result of a bilateral agreement between the local ruler and the European traders. Richard Smith, a certain English trader in the Sherbro area, stated in one of his letters:

> "That all European traders had to pay specified dues to the ruler whose country they traded in".[6]

EARLY TRADE ROUTE PATTERN CIRCA 1895

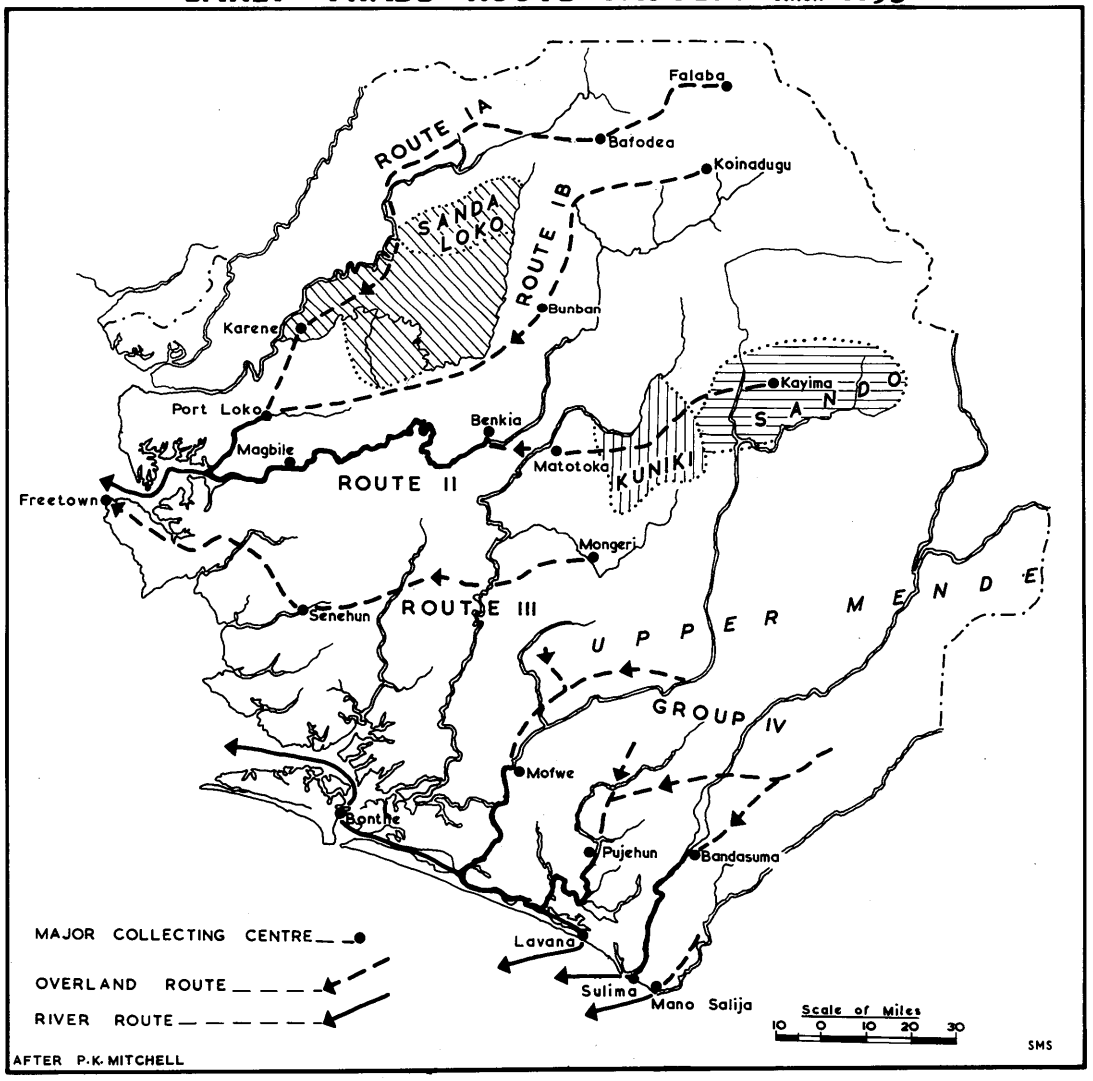

Fig. 3.2.

Such payment procured the right to trade and protection for the person and property of the trader. However, when the chieftaincy was vacant, the agreement was usually not honoured; for the several contesting petty chieftains began demanding dues which the traders were reluctant to pay. This led to looting of factories and the traders retaliated by kidnapping some of the tribesmen and selling them to slave ships as compensation for their loss. The general state of insecurity that usually accompanied such acts at the trading ports was only normalized when one of the disputants emerged as supreme ruler.

The trade in slaves had the economic advantage of dealing in commodities that could transport themselves to the trading ports. This saving in transport cost tended to extend the scope of the trade far beyond the immediate hinterlands of navigable waterways; and the profitability margin was hardly restricted by distance from ports. It showed no marked seasonal variation; the only noticeable fluctuation in commodity flow was due to the vicissitudes of intertribal warfare, the most important source of supply. Unlike the later trade in agricultural produce, the commercial structure of the slave trade had little use for middlemen, for African slave dealers brought their war prisoners to the trading posts and transacted business directly with the European slavers. As demand for cheap slave labour to work the plantations of the New World and the West Indies increased, the trade in Sierra Leone expanded to meet the rising demand and to reap the maximum benefits. The intensive and extensive traffic in human beings stimulated and sustained many social and economic patterns in Sierra Leone; foremost was the general prosperity

it brought to slave dealers and the great influence it exerted in concentrating early urban development in the coastal areas.

Trade in Primary Produce

The cessation of slavery resulted in a much more effective exploitation of primary produce. Because the new trade commodities were mainly low-value goods, resource exploitation inevitably showed a geographical concentration in the immediate hinterlands of ports. (Fig. 3.3). Hence the profitability of exploiting timber and palm kernels was severely limited by distance from navigable waterways. On the other hand, commodities like gold, ivory, rubber and gum, with a high value/weight ratio, could stand the heavy costs of head porterage and the areas of profitable exploitation extended far beyond the districts with easy access to navigable waterways. The pattern of trade in this period was characterized by the caravan tradition. The producers usually organized themselves into caravans to transport their produce to the coastal trading factories. Most of the "caravans" were small, about 10 people and consisted mainly of members of an extended family. A second channel was provided by itinerant traders who began each trade season with a stock of barter merchandise brought from the coast. They traversed the producing areas exchanging their stock either for money or for local produce which they sent back to the coast.

Although trade was mainly in the form of a simple exchange between local produce and European manufactured goods, some of which, as stated

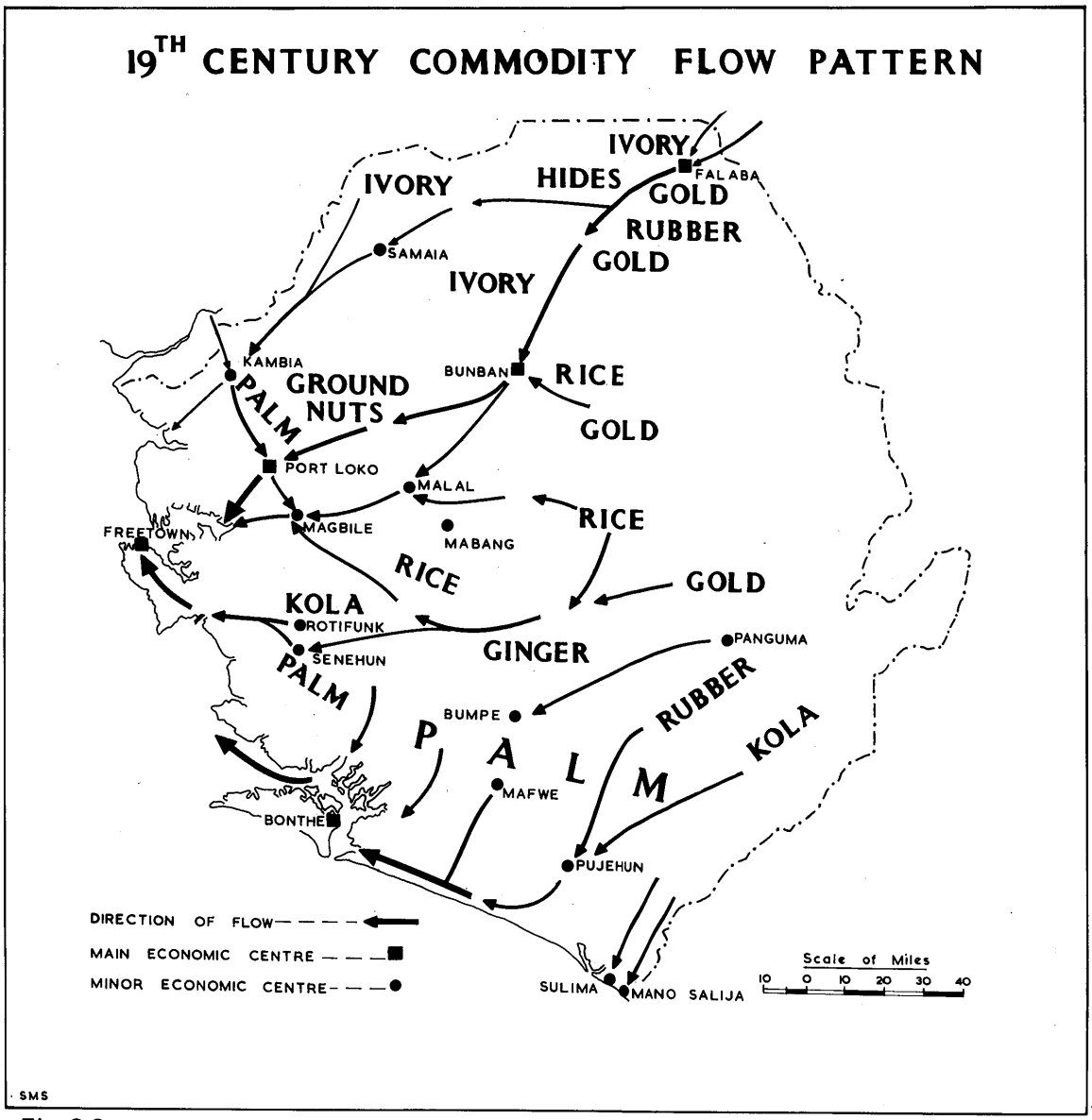
19TH CENTURY COMMODITY FLOW PATTERN
IVORY
FALABA
IVORY
HIDES
GOLD
RUBBER
SAMAIA
GOLD
IVORY
KAMBIA
BUNBAN
RICE
PALM
GROUND
NUTS
GOLD
PORT LOKO
MALAL
RICE
FREETOWN
MAGBILE
MABANG
RICE
GOLD
KOLA
ROTIFUNK
GINGER
PANGUMA
SENEHUN
PALM
BUMPE
RUBBER
KOLA
P A L M
MAFWE
BONTHE
PUJEHUN
DIRECTION OF FLOW
MAIN ECONOMIC CENTRE
MINOR ECONOMIC CENTRE
SULIMA
MANO SALIJA
Scale of Miles
10 0 10 20 30 40
SMS

Fig.3.3.

by D.P. Pereira, the Portuguese captain,

> "consisted of brass bracelets, basins, bloodstones, red cloth, linen, cotton cloth, gin, salt and matchets",[7]

there was a certain amount of more direct trade between the European merchants and the indigenous producers. Most of the trading concerns, especially the Sierra Leone Company, created an efficient system of commercial middlemen through whose hands the bulk of the trade passed. Such a commercial structure provided unique employment opportunities for the comparatively sophisticated Liberated Africans, who saw easy profit in trade compared to the laborious toil of agriculture on an indifferent soil, and this quickly stimulated their propensity to commercial enterprise. With the establishment and consolidation of this new commercial structure, a survey of the traffic revealed that the range of goods carried was quite small, but when the individual commodities involved are considered separately, a definite pattern, which is to a large extent connected with the type of transport used in each case, can be identified. With the rudimentary transport system, the cost of creating place utility for commodities was usually high. These factors had the effect of producing a spatial distribution of traffic inwhich high value goods were dominant among the commodities carried on the overland sections of trade routes, while the movement of low-value goods was largely restricted to navigable waterways and their immediate hinterlands. In short the proportion of low value commodities in the total traffic decreased with distance from ports, while that of high value goods tended to increase. As can be seen in Fig. 3.3

all traffic on the overland trade routes gravitated to the ports where it was collected for transhipment. From the northern rivers most of the traffic went to the major port of Freetown to be finally exported to overseas markets. On the southern trade routes, the port of Bonthe duplicated the export function of Freetown; the ocean ports of Lavana, Sulima and Mano-Salija, though engaged in direct import and export commerce, were functionally subservient to Bonthe. The above integration of overland routes and waterways to provide continuous trade channels, made ports not simple terminal points for water transport, but in true perspective, important arterial nodes in the entire transport system.

The social and political consequences of trade at this period were immense; and one outstanding feature was the instability it inevitably imposed upon the country. The growing trade in agricultural produce in the first quarter of the 19th century, brought a wider area within the colony's economic sphere and even encouraged chiefs to engage directly in trade. Chiefs who controlled heads of navigation where traders congregated grew rich from rents and duties. The interior chiefs, because of their location beyond heads of navigation, could neither engage profitably in trade nor benefit from rents as did the coastal chiefs. Often the interior chiefs invaded the coastal areas to gain control of the ports and hence, trade, instead of stopping warfare, often provoked it. Such wars have often been described as intertribal wars, but in reality, they were simply trade wars involving individual chiefs and their peoples rather than tribes. Their objectives were primarily economic. For example, the ownership of the wharf

at Mafwe, which six different chiefs had claimed, led to a war that raged sporadically for ten years. Likewise the Sherbro, Mende, Temne and Gallinas wars of this period had a common source in disputes over the ownership of ports.

British policy, despite the obvious disruption of trade by these wars, was mediatory and ineffectual. It is believed that, had the colonial administration despatched forces to protect the river ports as was often advocated by the traders, the frequent disruption of water transport and the consequent cessation of trade would have been minimized. However it was a long time before the colonial authorities realized that, if trade through the river ports was to expand, military protection was necessary.

Water Transport Today

Unlike the railway and road transport industries, water transport has never been a direct state concern; hence it has always lacked the necessary financial investment to improve, modernize and be competitive. It has lagged behind the rapid economic and technological changes that are taking place in the entire transport industry and consequently, is neither contributing substantially to, nor benefiting from, the economic and social progress of the country. The trend of decline, precipitated by the coming of the state-owned railway, is general in all the rivers, and it is only the Scarcies, Sierra Leone and Sherbro river systems that are today of any economic significance. It must be stated that the decline in water transport is not a peculiarity of Sierra Leone; it is also

noticeable in many west African countries. The basic causes are similar; water transport is inefficient and uncompetitive. Before the railway era, the industry virtually monopolized the commercial movement of freight and passengers, but the introduction of the more efficient and economic rail transport diverted most of the bulky low-value freight traffic to the railway and left water transport a depressed industry. In Sierra Leone, because the railway traversed territory north of the heads of navigation, water transport still had substantial traffic in coastal-oriented regions; however the immediate post-war development of road transport with its unique flexibility, has introduced severe competition even in these coastal areas and is attracting away the bulk of the traffic from the comparatively cheaper water transport.

Traffic Flow Pattern:

Several factors have interacted to produce the present pattern of traffic movement. Primarily the location of some of the best agricultural lands in the lower reaches of rivers led to the early utilization of water transport in the movement of agricultural produce. Intensive rice cultivation, centred on the seasonally flooded swamplands of the Lower Scarcies, have fostered the growth of river ports like Rokupr, Kychom, Kasiri and Mambolo - all below the head of navigation at Kambia - into centres of commercial exchange. From these river ports, rice and other produce move down to Freetown in medium-sized launches which carry a return freight of mainly imported goods, for distribution in

the densely populated Scarcies region. In the Upper Scarcies, palm kernel and palm-oil industries assume major significance, and the river ports of Kambia and Mange are the important collecting centres from where the commodities are exported to Freetown.

In the Sierra Leone river and Port Loko creek, rice cultivation is on a small scale and limited to the adjacent lands of the lower river reaches, but the oil palm industry is more important and has a wider distribution. Large consignments of palm kernels travel from here to Freetown in launches and Bullom boats. The real economic significance of the Bullom region lies in the great variety of foodstuffs that is produced and regularly shipped to the markets of Freetown. (Fig. 3.4). In the movement of this traffic, the plank-built Bullom boat is dominant. In the mornings the boats use the 'down river' breeze to sail to King Jimmy wharf in Freetown and in the afternoon between 3.30 p.m. and 4.15 p.m., take advantage of the "up river" breeze to sail to the Bullom shore. This important trade in perishable foodstuffs is tightly geared to the regular market days of Tuesday, Thursday, and Saturday and this alternate rhythm regulates the flow of Bullom traffic.

Traffic in the Sherbro river system is focussed mainly on the island port of Bonthe, which is the main receiving port for the Sherbro hinterland area. From the inland ports of Sumbuya, Mattru, and Gbundapi, rice, palm kernels and piassava (also from the Pujehun District) move on to Bonthe for transhipment to cargo boats (palm kernels and piassava) or

WATER-BORNE FREIGHT SHIPMENT TO FREETOWN 1966

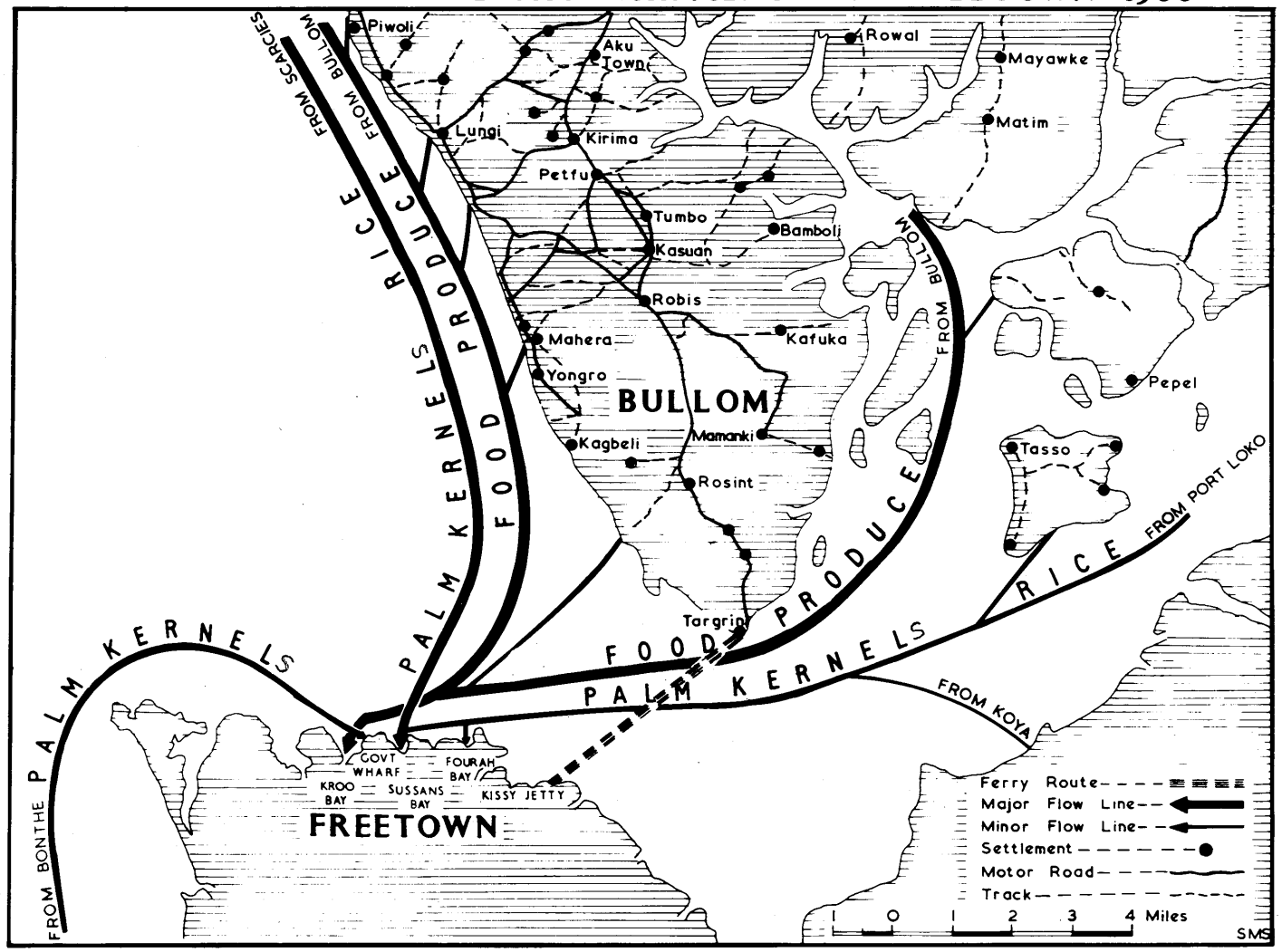

Fig.3.4.

to launches (rice) for export to Europe and Freetown respectively. For return load the launches and boats take back imported goods to the river port towns for distribution in their respective hinterlands.

Mineral Ore traffic:

Water transport is today of vital importance to the exploitation of the bulky low-value minerals of iron ore, bauxite and rutile. For the export of these ores, two specialized ports, Pepel and Niti have been constructed on Pepel island in the Sierra Leone River and on Niti Island in the Gbangbaia creek (Fig. 3.5). The Port of Pepel, owned by DELCO, is linked with the iron ore mines at Marampa by a 52-mile, 3ft. 6ins. gauge mineral railway; both port and railway were improved in 1964 to cope with increased production at the mines. From the Milton Margai Pier at Pepel, ships are mechanically loaded at the rate of 2,750 tons per hour. From Pepel, the ore ships negotiate the Sierra Leone river channel, bypass the main port of Freetown and move direct to the great iron and steel mills of England (Middlesbrough, Glasgow, London), Netherlands and Western Germany. At Niti, the Sierra Leone Metal Company Limited, the bauxite concern at Mokanji Hills in the Moyamba District, and Sherbro Minerals Limited, the rutile company in the Imperi Chiefdom of Bonthe District, have both constructed loading installations with a common tarmac access road linking the two mines with the port.

The transhipment problem according to officials of both companies, is likely to create a bottle-neck situation with increasing production. At present, transporting the ores from the port to the ships involves

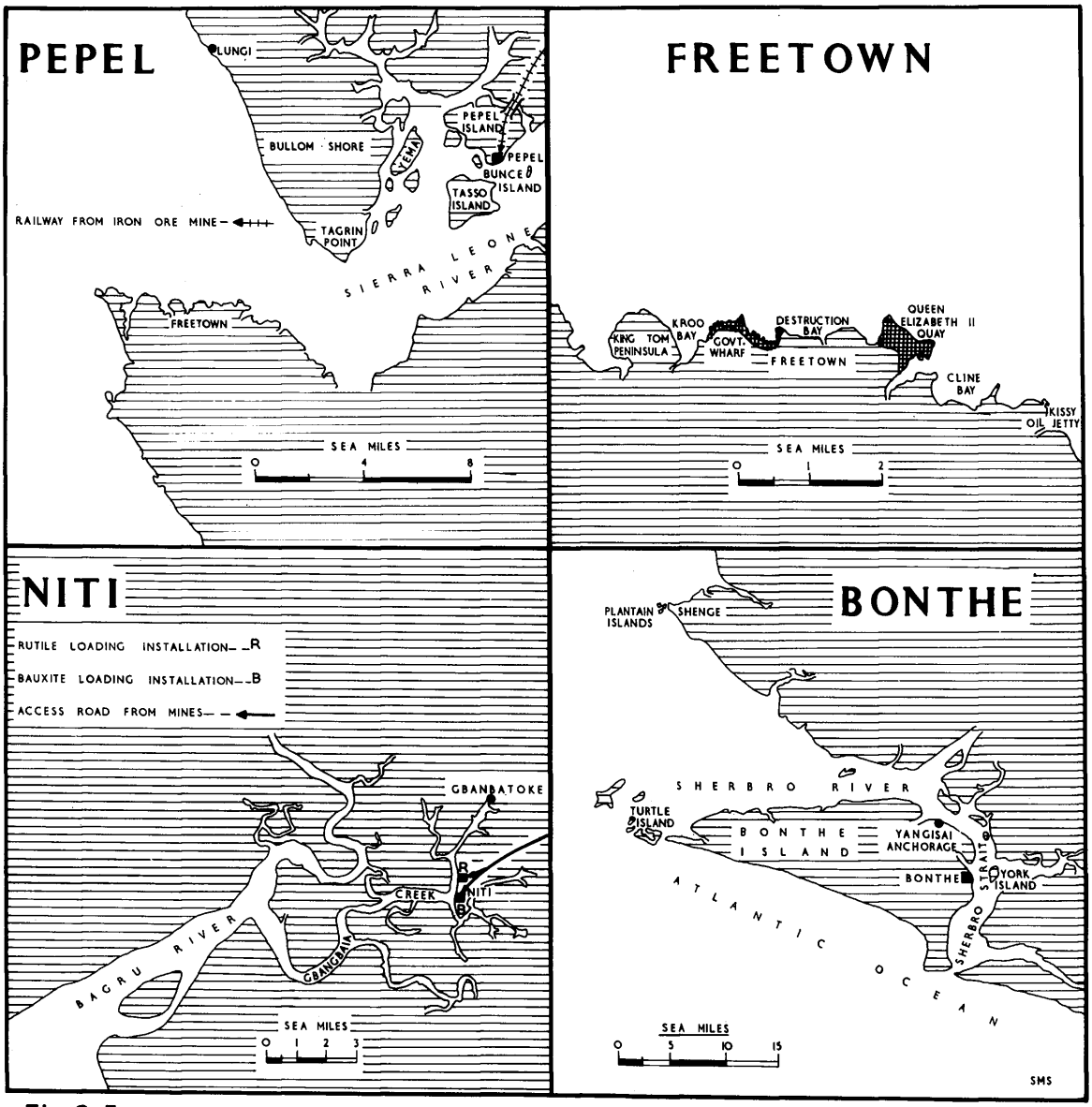
PEPEL
LUNGI
PEPEL ISLAND
BULLOM SHORE
KEMA
PEPEL
BUNCE ISLAND
TASSO ISLAND
RAILWAY FROM IRON ORE MINE
TAGRIN POINT
SIERRA LEONE RIVER
FREETOWN
SEA MILES
0 4 8
FREETOWN
KROO BAY
KING TOM PENINSULA
GOVT WHARF
DESTRUCTION BAY
QUEEN ELIZABETH II QUAY
FREETOWN
CLINE BAY
KISSY OIL JETTY
SEA MILES
0 1 2
NITI
RUTILE LOADING INSTALLATION R
BAUXITE LOADING INSTALLATION B
ACCESS ROAD FROM MINES
GBANBATOKE
R
B
NITI
CREEK
BAGRU RIVER
GBANGBAIA
SEA MILES
0 1 2 3
BONTHE
PLANTAIN ISLANDS
SHENGE
SHERBRO RIVER
TURTLE ISLAND
BONTHE ISLAND
YANGISAI ANCHORAGE
BONTHE
YORK ISLAND
SHERBRO STRAIT
ATLANTIC OCEAN
SEA MILES
0 5 10 15
SMS

Fig.3.5.

two transhipments, one at a point 20 miles down stream where barges discharge their cargo into the ships until a 24-foot draft is achieved, then both barges and ships, especially for bauxite, have to move further out to deeper water at Buoy 4, for final transhipment. The whole process takes 24 hours, for apart from time consumed in unloading, the barges usually take 5 hours (with the tide) to reach the ships and 7 hours (against the tide) to return to port. Also with increased production, the present lorry fleet each vehicle of which already makes 9 daily trips would be inadequate to move the ore fast enough. Furthermore, any substantial increase in the truck fleet would impose a serious strain on the already overtaxed road capacity. Thorough replanning of the transport sector of these mining industries is required: expansion of port facilities, barge and truck fleets and most important of all, road capacity, are prerequisites for the materialization of the anticipated yearly production figures of 200,000 tons (bauxite) and 100,000 tons (rutile). If the transport problem is given immediate attention, then the bright future of the industries will be enhanced. The outlook for rutile is particularly good in that demand from the space and aircraft industries is constantly increasing and the Sierra Leone source is believed to be one of the richest in the world.[8]

Water Transport in the Economy

From the above section, it can now be stated that water transport has a dual function in the national economy. Firstly it serves the internal market primarily in the distribution of locally produced foodstuffs. Definite statistical data relating to the volume of such traffic is non-existent, but observation suggests that there is an

appreciable volume especially in the Scarcies and Bullom areas. On the whole it is estimated that the share of waterborne traffic in internal trade is in the region of 70-100,000 tons; of this total, rice from the Scarcies, Port Loko and Bonthe areas accounts for a meagre 7-8,000 tons while fish movements are likely to make up 20,000 tons. The remainder consists of a wide variety of agricultural produce and a significant tonnage of imported goods.

Secondly water transport is of vital importance to the export economy especially the trade in minerals. For cash crops, its dominant role has long since been lost to rail and road competition and the movement of commodities like cocoa and coffee no longer involves water transport. Only palm kernels from the Bullom, Scarcies and Bonthe hinterlands and piassava from Pujehun and Bonthe Districts, are still precariously withstanding road competition and providing a fluctuating traffic. In the field of mineral exploitation, traffic contrasts strikingly with the moribund cash crop movement; tonnages of iron ore, bauxite and very soon rutile, handled by internal water transport are steadily increasing and there are hardly any indications suggesting a cessation in the present upward trend. It must however be stressed that while bauxite, rutile, palm kernels and piassava depend on local craft and transhipments before final export; iron ore does not. At the port of Pepel which is administered under the aegis of the port of Freetown, for it is here that clearance is effected, iron ore is loaded direct into ocean-going vessels and the journey involves no further transhipment. Hence Pepel traffic is essentially

similar to traffic originating from the port of Freetown. It properly belongs to external water traffic. Nevertheless it is included in internal water traffic because the loading of the ore and the first stage of its journey are accomplished in the Sierra Leone estuary, which is part of the internal waterways system. This inclusion effectively demonstrates the total of documented export traffic handled by internal water transport as shown in Table 3.2.

TABLE 3.2 WATER-BORNE TRAFFIC - EXTERNAL TRADE (in tons)

Year	Bauxite	Iron-Ore	Palm Kernels	Piassava	Total
1960	-	1,540,000	10,919	4,804	1,555,723
1961	-	1,668,000	10,727	4,732	1,773,459
1962	-	1,983,000	12,639	4,192	1,999,831
1963	20,000	1,954,000	10,170	4,578	1,988,748
1964	128,000	2,041,000	9,598	4,163	2,182,761
1965	173,000	2,265,000	9,329	4,198	2,451,527

Sources:

(i) Quarterly Statistical Bulletin No. 4. Dec. 1964, p. 17.

(ii) S.L.P.M.B. unpublished data 1960-1965 Freetown Ho/c/1

(iii) A. Genet and Co.; P.Z. Ltd.; C.F.A.O. - Unpublished data 1964-1965.

(iv) Bank of Sierra Leone - Unpublished data 1966.

Passenger Traffic

As in the case of internal freight traffic, statistical data on passenger traffic is hard to come by. Thus, great reliance has had to be placed on the results of intensive and extensive sampling both in the river ports and Freetown. On the whole, passenger volume is small, in 1965 it was estimated at 400,000. Of this about 60% was in the Scarcies and Bullom areas, 23% in Bonthe and its hinterland, 17% in the remaining areas.[9] Traffic originating from the northern rivers invariably has Freetown as destination while the bulk of southern river traffic is focussed on Bonthe. The Bonthe area averages about 8,000 passengers per month; 4,800 travel on the Sewa river route linking Sumbuya on the mainland with Bonthe, 1,800 on the Mattru-Bonthe route, 400 on the Gbangbatoke-Bonthe route and the remainder is accounted for by intracoastal channel and Freetown traffic.

A recent and expanding sector is the ferry service linking Kissy Jetty (Freetown) with Tagrin Point. (Fig. 3.4). It is the principal traffic channel connecting the international airport at Lungi and Freetown. There are at present three ferries operating a 40-minute schedule. Although the ferry is primarily intended to replace the former air passenger launch service which was slow and uneconomical, it has now become of major significance to the economy of north-west Sierra Leone. This is indicated by the fact that over 80% of ferry revenue (1965) came from sources other than airport traffic. The service has not only created its own traffic in the form of vehicles

using the shorter ferry route across the Sierra Leone river to Port Loko District, but is increasingly attracting an appreciable volume of the traditional Bullom boat traffic. The preference for ferry service is based on its regularity, cheapness (20 cents (2/-) per trip per person) safety and above all, its greater speed when compared with the hand-propelled, wind-assisted and tide-controlled Bullom boats. This service, no doubt, has an immense strategic significance for it links up with the only modern international airport and its growing diverse traffic as seen in the operation of 2043 trips valued at Le 15,516 (£7,758)[10] in 1966, is indicative of its vital role in the nation.

Organization of the Industry

Although it is impossible to ascertain the numbers and ownership of light craft plying in the inland waterways, there is no doubt that there are a large number of boats, canoes and launches and many lighters and barges. According to information culled from official files in the river districts of Kambia, Port Loko and Bonthe, and data included in the 1963 Fishery census, the number of craft may easily exceed 3,000. Table 3.5 gives a rough analysis of craft type and regional distribution based on port of residence and/or registration.

TABLE 3.3 REGIONAL DISTRIBUTION OF CRAFT

Craft Type	Scarcies/ Bullom	Western Area	Moyamba	Sherbro Island	Pujehun
Canoes	349	816	385	329	101
Bullom Boats	329	186	124	24	-
Launches	46	13	-	31	-
Trawlers out board	-	17	-	-	-
Engines	26	24	48	6	10
Total	750	1,056	557	380	111

Source: Partly from Report on Fisheries Division (Freetown) 1963.

Note: Regional Division is not strictly geographical; it is administrative.

Table 3.5 reveals a pattern in which canoes constitute over 70% of all craft; these boats are used mainly for coastal fishing and transporting the catch to the collecting points where fishmongers effect wholesale purchases. Bullom boats are found almost everywhere but mainly in the Scarcies, Bullom and Western areas. Launches and lighters in the Western Area (Freetown) do not engage in long-distance movement of commecial freight and passengers. They are largely owned by the Port Authority and perform a shuttle service between small cargo ships and the lighterage wharves so as to minimize congestion in the port and avoid the uneconomical time lag in waiting for a berth. Hence with these

lighterage facilities, the Port Authority can handle five ships at a time instead of three which is the port's present capacity.

The great majority of the smaller craft are owned and operated by Africans, thus putting the African entrepreneur in a potentially monopolistic position in the industry. In the matter of organization, the structure is similar to road transport. In the past, there were important European and Lebanese/Syrian launch owners who integrated trading with transport operation, but their importance has shown a marked decline in the last ten years, a trend also found in road transport. Chronic individualism and operation in small units with concomitant low profit margins, still hamper the progress of the industry. The commercial launches are usually small, varying between 7 and 24 tons, the majority being of 10 to 15 tons capacity.[11] Functionally they are unspecialized, catering for both passengers and freight. For a remunerative and efficient enterprise, the need for bigger and better vessels with a higher standard of maintenance is obvious. At present, the high cost of modern launches (Le 100,000-120,000) is a severe prohibitive factor in their general introduction into water transport. Most, if not all African entrepreneurs, cannot afford the price of a modern launch, hence they invariably purchase local launches which are simply wooden frames fitted with motor engines. These crude boats, assembled and pieced together by local boat-builders, manage to function well in the first few months, but thereafter, they spring leaks and rot and sometimes the engine leaves the hull and fatal accidents occur. The boats lack life saving equipment, they are overloaded

and although there are laws which, if enforced, would scrap these extremely sub-standard vessels, yet government leniency in the case of this depressed industry allows them to continue operating. Each Bullom boat or launch is usually manned by a crew of 6-10 men, who are poorly equipped to run the boats efficiently. Hence apart from the economic difficulties plaguing the industry, its man power needs greater technical training. Water transport in this respect poses both immediate and long term problems.

Conclusion

The present pattern of water transport presents a complex picture and generalizations about the entire industry will only tend to mask the different growth patterns of the various sectors. The preceding sections have revealed firstly that water transport as a medium of internal commerce, is in decline and the only areas of comparatively gainful operation are localities not yet easily accessible to road transport. Road competition has been a primary factor in this decline; it has attracted both freight and passenger traffic and the price incentive of water transport's lower fares has not been strong enough to check the loss of traffic. Further, entrepreneurs in this industry have demonstrated a consistent lack of competitive organisation to ensure successful operation. Most boat owners are not aware of this fault. They attribute the decline of water transport to two inter-related factors, namely the migration of European firms from the river ports to the more prosperous interior centres. Such developments might, it is true, be responsible for some reduction in the volume of traffic available, but this would only apply

to traffic in imported goods. The movement of produce for export has not been substantially affected by these changes, for the collecting centres have shown no important shift in location nor have there been major fluctuations in the volume of exports. Traffic in agricultural produce is still available but as in the case of other commodities, road transport has become the main carrier. Thus the decline in inland water transport is largely the result of competition from the roads rather than a result of the recent spatial re-distribution of commercial enterprises inthe internal economy.

In the field of mineral exploitation, the industry is showing rapid progress. The fact that bulky low-value mineral ores are located near navigable waterways make water transport the ideal mode. Iron ore, bauxite and rutile mining concerns have each constructed modern and efficient loading installations at Pepel and Niti respectively to facilitate the export of their mineral ores, and to take advantage of the comparative cheapness of water transport.

In the case of passenger traffic there has been a marked decline in the traditional routes which can be attributed mainly to road competition. However appreciable expansion has occurred in the more recently established ferry service between Kissy Jetty and Tagrin Point. Expansion in this sector is due to scheduled operations, speed and, most important of all the tremendous reduction in the travelling distance and time between Freetown and north-west Sierra Leone.

Despite the shortage of accurate data, the foregoing sections indicate that the potential for water-borne traffic is considerable. Taking into account the various growth factors in the economy, it can be assumed that, with adequate and systematic improvement, traffic in agricultural produce, mineral ores, imported goods and even passengers, will attain unprecedented levels. For the realization of such growth, the improvements indicated below are considered essential.

First the waterways must be systematically charted to locate underwater obstacles and shifting channels. Inland wharves must be improved so as to facilitate the loading and unloading of boats. Investment by entrepreneurs in more reliable craft, and the larger vessels using the waterways should be adapted to mechanical propulsion. In particular the V-bottom Bullom boat with its low carrying capacity and high accident rate should be replaced with a shallow-draft, broad-beam steel hull boat that will carry heavier loads more safely and operate in shallower waters. There is an immediate need to rationalize water transport. The uneconomic individualism of small-scale operators is retarding expansion and modernization of the industry. The present unskilled personnel operating the boats not only leads to rapid depreciation of capital equipment and low profit margins, but also to high accident rates especially in the flood period of the rainy season. Hence it is considered a matter of particular urgency that they be given scientific and technical training in all aspects of navigation. For this, Fourah Bay College might consider the establishment of a school of Marine Engineering in its Engineering Department where engineers, wainwrights and navigators will receive adequate training so that water

transport can have a reliable source of qualified personnel to man the industry.

The improvements outlined above need not all be undertaken concurrently nor completed within a short period. At present, observation shows that the busiest waterway is northwards along the coast from Freetown as far as the Scarcies estuary. This area of appreciable traffic should be given top priority in any improvement scheme especially in the provision of navigational aids. Later, the inland ports of Rokupr, Kychom and Mambolo in the rice growing area could be systematically developed (Fig. 3.6). The next region would be the waterways of the Sherbro river system; dredging in the Gbangbaia creek, though expensive, should be carried out so as to facilitate easy access by large ore vessels to the specialized mineral port of Niti. Further, the economic potential of the lowlands and tidal lands of Bonthe District is promising from the stand point of fishing and agriculture; here the development of new collecting centres for produce is likely to take place. With expansion in the fishing industry, one can envisage the prompt delivery of frozen fish from Bonthe by boat to river ports and distribution up-country in refrigerated trucks. The rolling swamplands adjacent to the river ports are excellent for rice cultivation (a staple still imported into Sierra Leone), and places like Gbundapi, will, with successful cooperative rice farming, emerge as important ports of exchange.

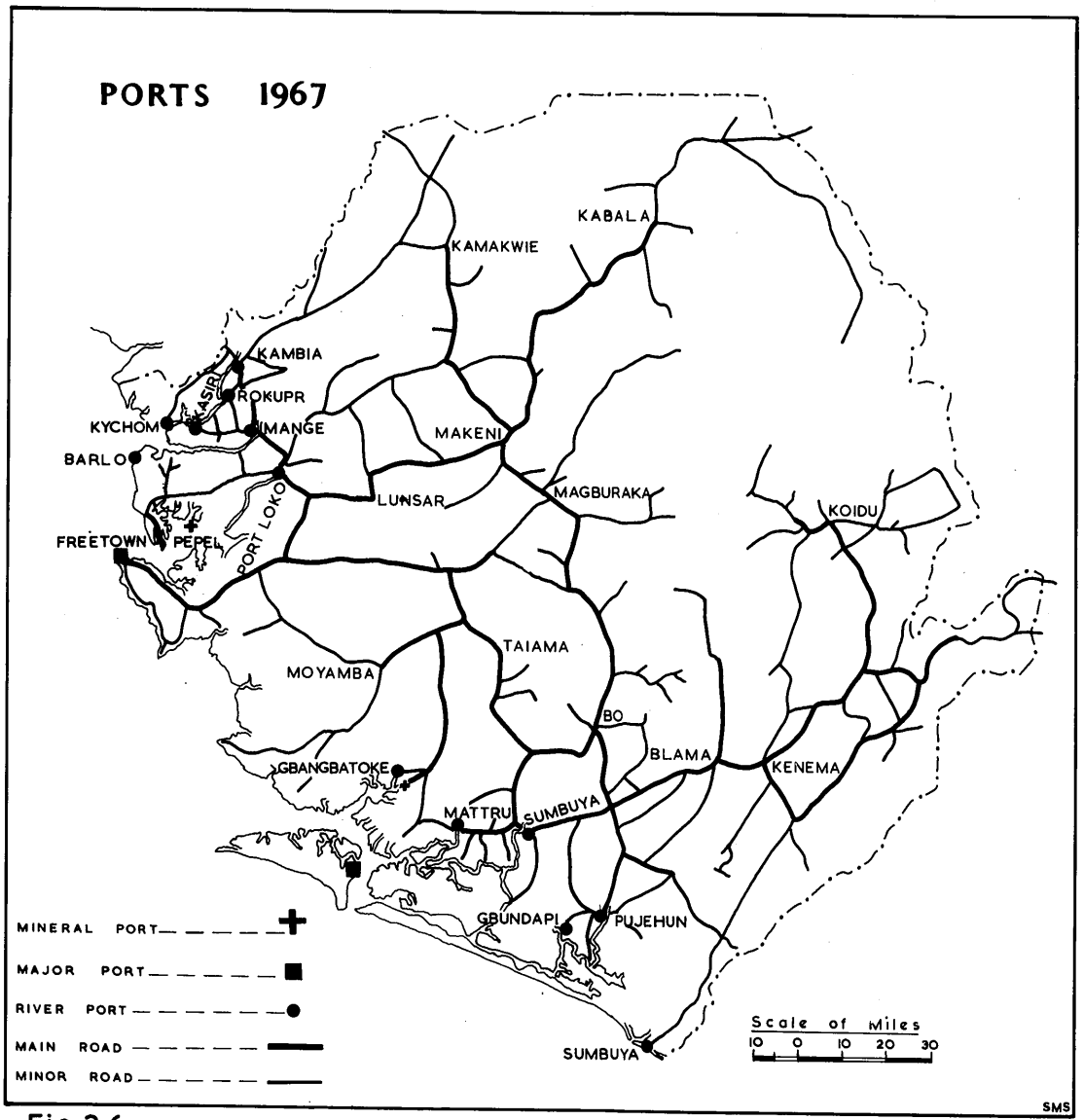
PORTS 1967
KABALA
KAMAKWIE
KAMBIA
ROKUPR
KASIR
KYCHOM
MANGE
MAKENI
BARLO
LUNSAR
MAGBURAKA
KOIDU
PORT LOKO
FREETOWN
PEPEL
TAIAMA
MOYAMBA
BO
BLAMA
KENEMA
GBANGBATOKE
MATTRU
SUMBUYA
GBUNDAPI
PUJEHUN
SUMBUYA
MINERAL PORT
MAJOR PORT
RIVER PORT
MAIN ROAD
MINOR ROAD
Scale of Miles
10 0 10 20 30
SMS

Fig.3.6.

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6. Fyfe, C. Op.cit. p. 67.

7. Pereira, D.P. Esmeraldo de situ orbis (ed. J. Maury, Bisau, 1956), pp. 95-99.

8. Flamingo. London. V No. 7, April 1966, p. 2.

9. Estimates by District officers, Native Administration clerks and several boat owners.

10. Figures relate to 1966 estimates of ferry operation by the Sierra Leone Port Authority.

11. Personal Interview with Commander Hazlitt - Martin R.N., Harbour Master, Freetown, March 1966.

CHAPTER 4

THE ERA OF THE RAILWAY

Although the first recorded proposals to construct a railway in Sierra Leone were made as early as 1872, at a time when railways were having their full impact on mining development in areas like the Rand, it was not until 1892 that the government, with unremitting pressure from the Liverpool Chamber of Commerce, gave serious consideration to the proposals. The Sierra Leone Government Railway (SLGR), came ahead of demand since it was conceived and built to serve no particular commercial venture which was then in existence. Such vague terms as "to open up the country" for commercial pursuits as advocated by men like Lardner and Lamberg,[1] could scarcely attract enough attention whereas in Ghana, the concrete demand of the European gold companies made railway construction an economic proposition. Although the Liverpool Chamber of Commerce was the principal force behind the railway, government soon realized, through the economic foresight of administrators like Governor Cardew, that the availability of bulk transport was a prerequisite to the country's social and economic advancement.

Survey and construction

The first two surveys were made from Freetown to Bumban and from Mina to Gorahun between 1893 and 1894. The first route, Freetown - Bumban, was originally intended to go as far as Falaba, 80 miles further north, but at the time of surveying, Falaba had passed out of British jurisdiction.

The submission of the final survey reports did not immediately lead to the start of railway construction, for Governor Cardew, after an extensive tour of the country concluded that he was more than convinced of the desirability of projecting the railway through Mende country rather than towards Bumban.[2] He suggested a route leading from Freetown through Songo to Mano, Bo, Segbwema and ultimately to the Guinea frontier. Comparison with the present route structure in Fig. 4.1 shows that the Mina - Gorahun survey never reached the construction stage and the railway never got to Bumban. From this period railway construction emphasis shifted from the north and attention was concentrated in the south and east.

Several geographical and economic difficulties faced the construction of the line and these led to the adoption of a 2ft. 6ins. gauge line with the insufficiently compensated ruling grade of 1:50 and a curvature of 5 chains. The railway, coming at a time when the prospect for substantial traffic was virtually non-existent, forced the planners to embark on a line that was as cheap as possible so as to cut down losses before they actually occurred. Further, the terrain with its deep ravines, mangrove swamps and hills, militated against a straight rail route and produced a tortuous line where a train has to "negotiate 27,000 degrees of curvature, and go up and down a total of 3,000 feet before reaching Bo, 136 miles from Freetown and only 243ft. above sea level".[3] Under the prevailing conditions of limited finance and what were then insurmountable geographical barriers, it must be conceded that the planners had a fair amount of success in their task. However they failed to give adequate consideration to future expansion so that when traffic volume increased the railway's inadequacy was quickly exposed.

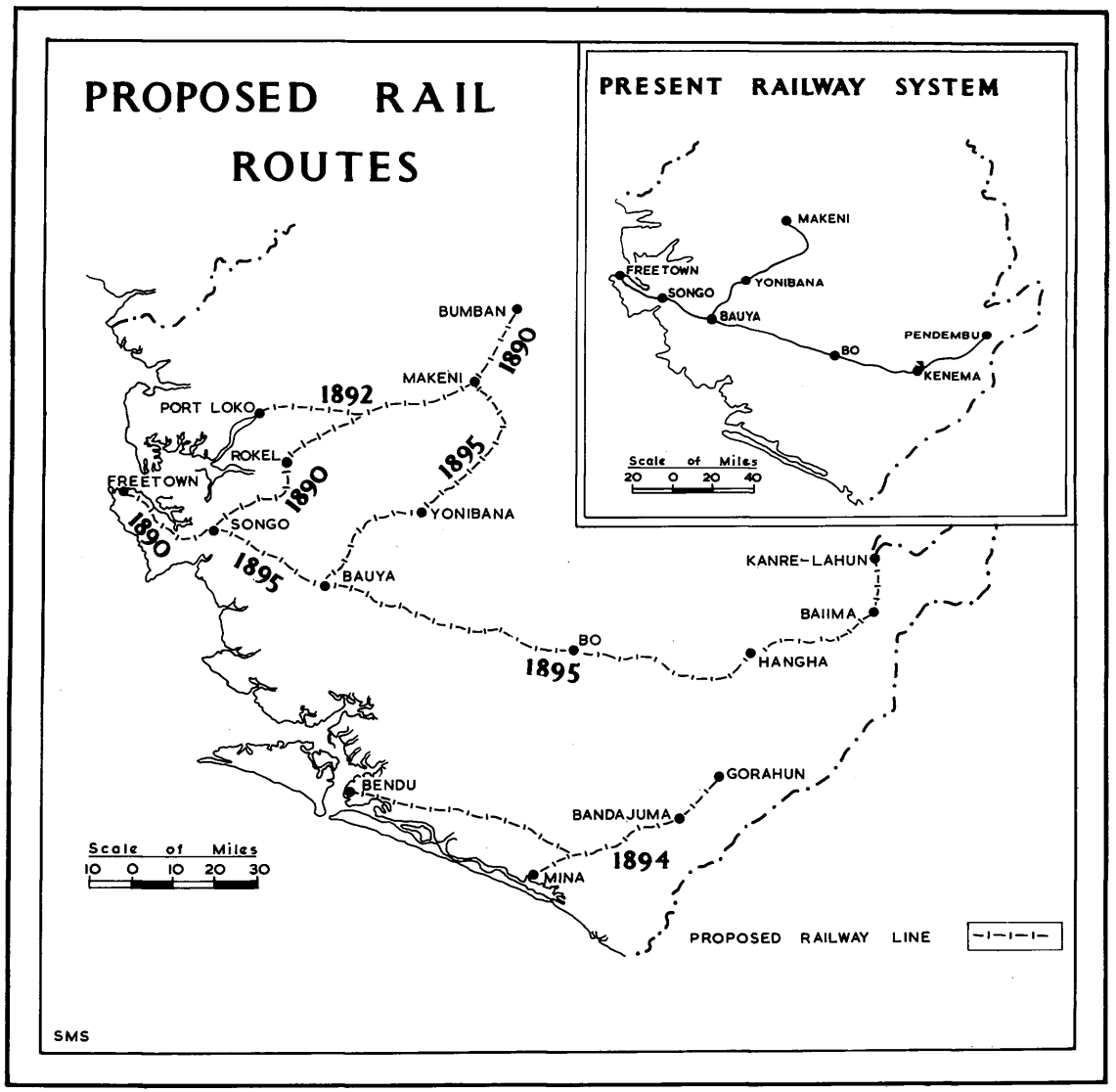
PROPOSED RAIL ROUTES
PRESENT RAILWAY SYSTEM
MAKENI
FREETOWN
SONGO
YONIBANA
BAUYA
PENDEMBU
BO
KENEMA
Scale of Miles
20 0 20 40
BUMBAN
1890
MAKENI
1892
PORT LOKO
ROKEL
1895
1890
FREETOWN
1890
SONGO
YONIBANA
1895
BAUYA
KANRE-LAHUN
BAIIMA
BO
1895
HANGHA
BENDU
GORAHUN
BANDAJUMA
1894
MINA
Scale of Miles
10 0 10 20 30
PROPOSED RAILWAY LINE
SMS

Fig. 4.1.

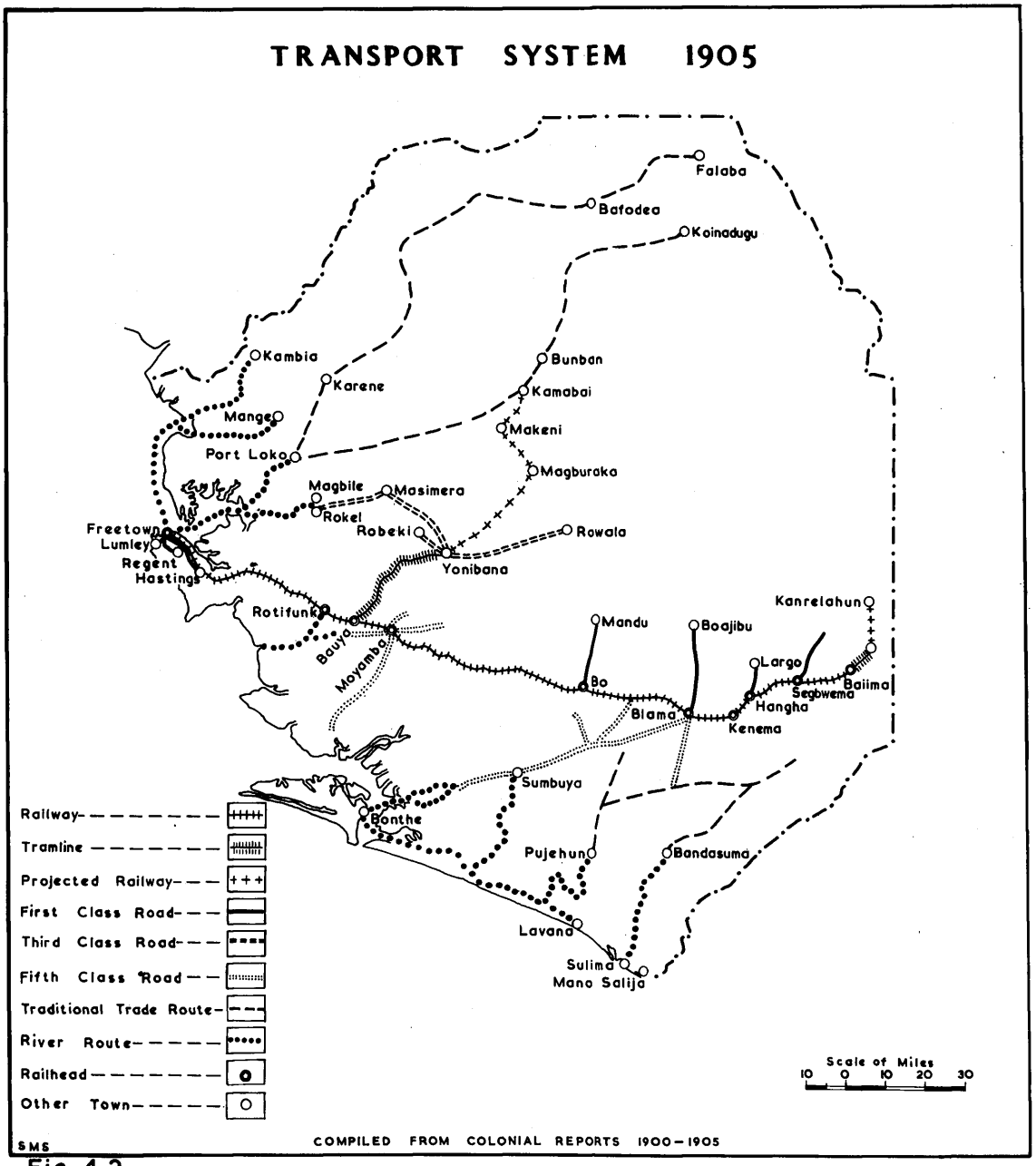
TRANSPORT SYSTEM 1905
Falaba
Batodea
Koinadugu
Kambia
Karene
Bunban
Kamabai
Mange
Makeni
Port Loko
Magburaka
Magbile
Masimera
Rokel
Freetown
Lumley
Regent
Hastings
Robeki
Rowala
Yonibana
Kanrelahun
Rotifunk
Bauya
Mayamba
Mandu
Boajibu
Largo
Segbwema
Baiima
Bo
Hangha
Blama
Kenema
Sumbuya
Bonthe
Pujehun
Bandasuma
Lavana
Sulima
Mano Salija
Railway
Tramline
Projected Railway
First Class Road
Third Class Road
Fifth Class Road
Traditional Trade Route
River Route
Railhead
Other Town
Scale of Miles
10 0 10 20 30
SMS
COMPILED FROM COLONIAL REPORTS 1900–1905

Fig. 4.2.

The route suggested by Governor Cardew, with its great attraction of tapping the wealth of a really rich palm belt in the Eastern Province, now became the accepted rail route and construction started in 1895. By 1897 the line reached Wellington (7 miles) and on March 29 of the same year, Governor Cardew and a select party made the first historic long trial run to Wellington, thus making Sierra Leone the first country to possess a railway in British West Africa. Later, in 1898, the line proceeded as far as Songo but was temporarily halted during the Hut Tax War, and the the railway was called upon to play its first military role in conveying troops to avert a threatened invasion of the Colony peninsula by Bai Bureh, the Temne warrior. Normal working resumed later and the line got to Bo in 1903, a distance of 136 miles. In 1905 the line was constructed to Baiima (220½ miles) and by 1908, had reached Pendembu (227 miles), its present terminus.

Branch Lines

The first branch line was the Mountain Railway which was opened in 1903 and had the distinction of being the steepest adhesive railway in existence, its maximum gradient being 1:24. Unlike the main line with emphasis on exploiting agricultural resources, the Mountain Railway was solely intended to convey European officials from their offices in Freetown to Hill Station, an ideal residential area for Europeans. However, it also provided cheap access to Freetown for produce from the mountain villages. The line was the first victim of road competition as the introduction and availability of cars to European officials made it redundant and was closed as early as 1929.

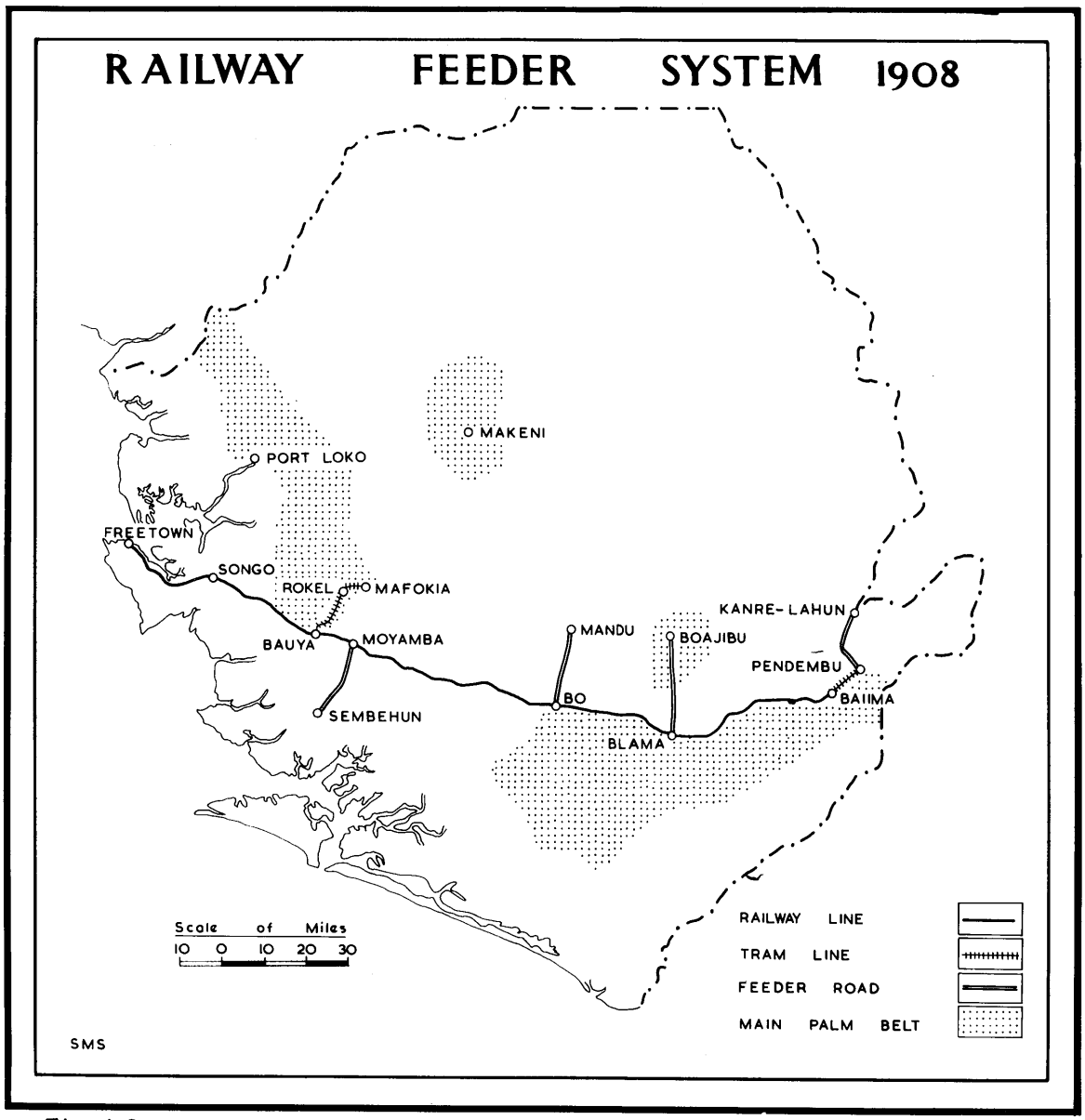
RAILWAY FEEDER SYSTEM 1908
O MAKENI
PORT LOKO
FREETOWN
SONGO
ROKEL
MAFOKIA
BAUYA
MOYAMBA
SEMBEHUN
MANDU
BO
BOAJIBU
BLAMA
KANRE-LAHUN
PENDEMBU
BAIIMA
Scale of Miles
10 0 10 20 30
RAILWAY LINE
TRAM LINE
FEEDER ROAD
MAIN PALM BELT
SMS

Fig. 4.3.

The present branch line, Bauya - Makeni (82 miles) was first preceded by tramlines (1907) whose purpose was to serve as feeders to the main line. This was a direct response to increasing production and the need to provide a more economical transport mode to move produce to the railheads, a function then being performed by head porterage. So successful were the tramlines that it was decided to convert them to railway lines with fixed schedules. Hence the line was pushed right on to Makeni in 1915 and further on to Kamabai in 1916 with plans for extension to Falaba near the Guinea frontier. But the line beyond Makeni proved a disastrous financial liability and was closed in July, 1930.

On the whole, the initial cost of constructing the railway when compared with Ghana and Nigeria, was low. In Ghana average costs of £10,314 and in Nigeria £7,064 per mile had to be met while Sierra Leone had the low figure of £4,316 per mile.[4] The low construction costs can be explained by such factors as the narrow gauge of the line, low wages (10d. per day) and the easy accessibility of local ballast material.[5] However these initial low costs did not fully compensate for the economic problems that were to face the line as can be seen from the financial results of working for the first four years in Table 4.1.

The Impact of the Railway

The immediate impact on the economy and society of Sierra Leone was enormous and far reaching. It provided, for the first time in the history of the country, a form of mechanical transport capable of handling large quantities of freight at very low rates.[6] Lugard's estimate that one train

of average capacity was equal to 14,000 head carriers at one-twentieth the cost, epitomizes the tremendous significance of rail transport.[7] Once even the intermediate stages were open to traffic, the wealth which Cardew had rightly forseen began to pour in from the Protectorate hinterland. Palm kernel production reached unprecedented levels. By 1909 its production was double and by 1912 more than treble that of 1897, with exports worth over £1½ million providing customs revenue of £301,140 for the government.

The bulk of traffic in this early period consisted of palm kernels, palm oil and Kola nuts which provided approximately 80% of total "down traffic". "Up traffic"[8] consisted primarily of imported goods like spirits, tobacco, salt and cotton piece goods. A noticeable feature was the almost complete absence of internal traffic except for a small tonnage of rice. This traffic pattern of export crops in one direction and imported goods in the other, was to be expected in a country where social and economic development had just begun. The coming of the railway effected locational change in commercial centres; trading emphasis shifted from the traditional factories on river banks to the new rail heads. European firms, Creole and Syrian traders migrated to rail head towns like Mano, Moyamba and Bo; commerce developed rapidly and the merchant community, apart from retailing imported goods, naturally acted as agents for the buying and collection of export produce. The commercial boom greatly affected the social and economic prosperity of the indigenous population, for the money acquired from the sale of produce was used to raise their standard of living. This period can also rightly be called the beginning of tribal disintegration.

The trains provided for the first time the means whereby people, who had known only the world of their tribal community, could move into other tribal areas and settle in the expanding railhead towns. Perhaps more important was the administrative role of the railway which effected to a great extent, the welding of the several tribes into a single centralized political unit. A feature often neglected in railway studies is the large volume of short-distance traffic on the railway line. In an underdeveloped country where head porterage is a significant method of moving goods, a rail track provides an excellent footpath for many villagers who cannot patronize the trains for their short journeys. Even today, with the rapid development of road transport meeting the needs of short-distance hauls, head loading along the rail track is still evident.

Railway Operation

The railway started full operation in 1899 and, as can be seen from Table 4.1, the first six years, 1899-1904, all showed deficits. This may be due to expenditure on capital works still in progress, but the main reason lies in the fact that the railway was still limited to the less productive country between Freetown and Bo. By 1905 when the line reached Baiima, the railway entered its "promised land" of palm kernels and palm oil and from then to 1913, it was not only able to cover its working expenses, but produced a surplus every year, the best record being a profit of £39,538 in 1912. The only exception to this prosperity was 1908 when there was a fall in gross revenue of over £3,000 due to the general stagnation of trade and a loss of £1,879 in operating the Mountain Railway.[9]

TABLE 4.1 FINANCIAL REPORT OF RAILWAY OPERATION 1899-1913 in £s

Year	Gross Expenditure	Gross Revenue	Deficit	Surplus
1899	4,392	3,810	582	
1900	14,284	10,344	3,940	
1901	18,518	17,757	761	
1902	21,229	20,442	787	
1903	31,926	36,620		4,694
1904	40,976	35,752	5,224	
1905	52,631	57,789		5,158
1906	55,769	62,158		6,389
1907	67,882	74,515		6,633
1908	81,695	71,499	10,196	
1909	81,086	84,229		3,143
1910	79,846	101,610		21,764
1911	79,740	107,621		27,881
1912	102,608	142,146		39,538
1913	146,483	168,315		21,935

Source: Annual Railway Reports 1908-1913.

The railway alone would not have been able to achieve this prosperity in a traffic market heavily dependent on small-scale peasant producers, without the help of a connecting feeder system. This was reflected in the early reluctance of traders to settle in railhead towns that lacked connecting links with the producing areas, emphasizing the point that such towns were commercially isolated. A programme of feeder construction was

therefore begun; the system had a north-south alignment providing a rational integrated route system capable of serving almost the entire palm belt. Prominent in the feeder system was the 7 mile Baiima - Pendembu tram line and the Bauya - Makump tramline, tapping the palm belt of the Yoni country (Fig. 4.2). The tram lines ran to no specific schedule, they ran when required and would stop to load produce at any place en route where it was offered. The feeder roads, used by both barrel rollers - casks with attached handles drawn along by hand in roller fashion, and hired out to the public at 4/- and 2/6 for 700 lb and 300 lb rollers respectively, per trip - and head porters, generally radiated from railheads to the surrounding country. Some of the more important feeder roads as seen in Fig. 4.3, were the Bo - Mandu, Blama - Boajibu, Pendembu - Kanre Lahun and Moyamba - Sembehun roads. So successful were the feeder roads that the local people, appreciating the advantages to be gained, began to build their own roads. By 1908, 150 miles of local roads had been constructed. As a further means of providing easy access to the railway, Government approved the use of the railway track as a thoroughfare and sanctioned the expenditure of £1,388 for constructing foot bridges on the railway at Mano, Blama, Daru and a further £25 was voted for a temporary footway over the Sewa bridge.

The railway continued to progress satisfactorily and the general increase in the colony's revenue (1909-13) was largely due to the railway. With the succession of profitable years and the accumulation of substantial surplus funds, further railway expansion made considerable headway. Additional rolling stock was put into operation to cope with increasing traffic which

had manifested itself in traffic congestion especially in the eastern districts. By 1913, the branch line was extended to Makump (now Magburaka) and effectively provided a means of tapping the palm-belt in Temne country.

The First World War

The war had an immediate impact on the external commerce of the country; total trade declined throughout the war period and never recovered its prewar level until after its conclusion. Exports declined 28% in value and despite strenuous attempts to remedy the situation after the period of accentuated submarine warfare, its highest level in the war period was still nearly 10% below the 1913 value. The loss of continental markets for export produce and the general decline in export prices, as evidenced by the drop in the value of palm kernels, then the major item of export, from £22 (1913) to £16 (1915) per ton, created a disincentive to greater production.[10] More disastrous is the trade in kola nuts which had practically ceased by 1916. The accelerated redirection of youthful labour away from the farms into the services, coupled with a succession of climatic troubles, not only reduced the effective labour force in collecting and preparing produce, but also diverted the attention of farmers to greater food production in anticipation of a series of hungry seasons. Apropos the effect these war years had on the railway, the tonnage of goods railed to Freetown from the Protectorate and the financial position of the railway (Table 4.2), are indices that reflect the then prevailing socialand economic situation of the country. On the whole, there was a general setback in revenue despite the stringent measures to minimize expenditure. Demands by the military forces had the general effect of raising railway revenue, but this was insufficient to

TABLE 4.2 RAILWAY OPERATION 1913-1919

Year	Tonnage railed from Protectorate	Financial Returns	
		Deficit	Surplus
1913	36,466	-	£21,935
1914	29,561	£47,004	-
1915	32,804		£ 8,049
1916	39,656		£25,144
1917	41,115		£20,837
1918	34,877		£ 6,124
1919	35,433	£29,850	-

Source: Railway Department Annual Administrative Reports 1913-14

compensate for the decline in the highly rated import goods and the drop in palm kernel production - the backbone of the railway. Despite the increase in tonnage railed to Freetown, the inflationary conditions then in existence, merely produced increases in low rated freight like local food commodities. Hence the bulk of goods railed is not necessarily reflective of true value.

The experience of the war overtly demonstrated the dependence of the railway on palm kernels. In a mercantile economy, the volume and value of primary products tend to dictate the prosperity of the country, for they not only provide foreign exchange to pay for imported goods, but also affect the purchasing power of the people. When a country depends on one basic export crop as was the case with perm kernels in Sierra Leone, the whole

economy tends to fluctuate with the rise and fall in prices of palm kernels.[11] For the railway, the depression created by the war in the palm kernel market was chaotic. Total receipts from public freight showed a catastrophic drop, for highly rated goods like palm kernels, kola nuts and imported merchandise declined absolutely. Passenger traffic was immobilized not only because the war time depression created a scarcity of money, but also because military needs took up much of the available capacity. The dominance of palm kernels in railway freight has continued to be the crucial factor in determining the profitability of the line. An additional problem was the rising cost of coal. By 1917 cheap South African coal was substituted in place of the more expensive Welsh coal, but the former was found to be swift-burning and unsuitable. A return was therefore made to Welsh coal at £6 6s. per ton and consumption was kept down by mixing it with local mangrove wood; local charcoal was sometimes used in place of coal in gas-engines. Although substantial savings were made, the deterioration of the rolling stock was accelerated.

On the whole the war did little good to the railway. There was some expansion in the branch line in that by 1915 the line had reached Makeni and in the following year, was extended to Kamabai. But against this achievement must be set the 1918 gross revenue of £148,962 and working expenses of £142,201, giving the alarming situation in which 95.45% of revenue was spent in working the railway. However the end of war brought to a close the first phase of railway development in Sierra Leone.

Railway operation 1920-1945

This broad period is important in that it comprises two boom periods and two slump cycles. The immediate postwar era was not marked by immediate economic improvement. The depressed conditions of trade in the war continued to be felt and the export market was still struggling to rehabilitate itself. 1920-1923 saw a general decline in the export sector of the economy and the railway lacked sufficient engine power and rolling stock to cope with available traffic. Hence the report of Colonel Hammond (1922) conclusively points to the fact that although there were definite signs of trade improvement, yet the railway was in no way capable of meeting the needs of the country. He advocated a drastic reorganization in freight rate structure, reduction in capital expenditure and the immediate improvement in the railway's motive capacity.[12] His recommendations were implemented and from 1923-1926, the railway showed a continuous surplus. The tonnage of palm kernels railed to Freetown increased enormously, imports took an upward trend and the railway was now in a position to benefit from the trade boom. In this expanding economy, the producers of cash crops experienced a real increase in their purchasing power and this is well illustrated by the following remark in the 1926 Colonial report:

> "The wealthier natives now demand something better than the ordinary trade cloth and are fully prepared to pay for them".[13]

However these boom conditions showed signs of a recession by 1927 when trade was said to have maintained a reasonably high level. 1928 and 1929 were definitely lean years and gave indications of the catastrophic slump that was soon to overtake the economy.

The Great Depression

The Depression found the railway with sufficient rolling stock and motive power, but freight and passengers were just not available. Again the characteristic behaviour of a preponderantly export economy had its full effect. The trade depression and consequent low prices for export crops distracted farmers from cash crop production, and their low spending power made them reluctant to use the trains. Unlike the 1914-18 war depression in export crops, this one had the added disadvantage of being faced with intensive road and water competition in the really productive part of the railway areas. Competition was much more severe in the Northern Province along the Makeni - Port Loko road, diverting traffic from the branch line to Port Loko; whence water transport was used to move the valuable export to Freetown. On the back haul, these predatory transport modes, as they were described by the railway authority,[14] carried high-rated import goods. In the Southern and Eastern Provinces, with palm belt located away from the navigable water reaches, traffic pirating was not intense. But as will be seen later, this situation was to deteriorate, for the development of the road feeder system neatly created an effective route linkage between the most productive railheads and the riverine ports, providing alternative highways to the railway for import and export traffic.

The railway reacted to the slump and road competition by reducing fares and rates, and successfully urging the government to impose road tolls so as to curb the unfair and predatory competition by road transport. Hence a series of road tolls were imposed first on the Port Loko - Makeni road (1934) and Matiki - Pamelap section of the same road (1937), prohibiting

the transport by road of:

(a) goods not manufactured in Sierra Leone between Matiki and Pamelap (in the direction of Makeni),

(b) Palm kernels from Pamelap to Matiki.[15]

Secondly, the same prohibition was applied to the Mano - Bumpe road in 1938. Further, to recapture palm kernel traffic in particular, government paid a subsidy of £20,000 to the railway which was later changed to 15/- per ton of palm kernels conveyed to compensate for the big drop in palm kernel rates. This subsidy was justified on the grounds that customs revenue would gain by the increased traffic thus encouraged. The effects of these measures were reflected in an overall increase of rail freight. Road and water competition were checked, though the depressed trading conditions contributed appreciably to a reduction in road competition. Passenger traffic was slow to recover; for despite the 50% decrease in 3rd class fares, trade conditions were such as to limit severely the spending power of the people. However by 1936, the slump had shown signs of waning and the price of palm kernels was £2.1.4 per ton higher than the 1935 level. 1936 in fact proved to be the most successful year of operation since 1927; public freight reached a record level of 75,437 tons; 3rd class passengers increased by 137% over the 1930 level, and the railway actually had a surplus of £12,638. Table 4.3 gives a fair appraisal of this period, selecting representative years, and important commodities both in the import and export sectors so as to present an analytical table where trade vicissitudes are mirrored.

TABLE 4.3 RAILWAY OPERATION 1924-1936 in Tons

Year	Local Produce		Imported Goods			Total
	Palm Kernels	Food Stuffs	Building Materials	Salt	Cotton Goods	Freight
1924	34,935	2,235	1,021	3,852	601	68,493
1925	35,424	2,212	1,678	3,524	783	72,298
1930	27,649	2,101	198	2,712	521	53,553
1931	32,964	2,731	117	1,995	367	56,551
1932	41,945	2,895	201	2,480	807	65,115
1933	33,268	2,521	140	2,258	402	53,926
1934	33,926	3,935	327	2,174	420	58,811
1935	43,104	3,086	249	2,415	863	70,294
1936	44,413	3,670	437	3,161	1,108	75,437

Source: Annual Railway Reports. 1924-1936

This period also coincided with the early exploitation of the mineral resources of the country. In contrast to Ghana, where the mineral companies provided freight for the railway, in Sierra Leone, the industry was such that the railway did not benefit in any great measure. Gold mining in the Northern Province produced only a low bulk high value product whose transportation did not affect railway freight. The same is true of diamond mining in the Kono District. Even building material and machinery connected with the mining industries did not appreciably contribute to railway freight. However the successful exploitation of the Hangha chrome deposits with its low-value bulky product, gave the railway its first regular mineral freight. But the

rates charged had to be low, 1½ pence per ton/mile - a transport subsidy that was essential in making chrome ore competitive in the world market.

1937 saw a further improvement in the country's economic situation and the railway had a surplus of £8,432. By 1938 another bleak economic period had begun and the price of palm kernels fell from £8.12.6 a ton (1937) to £5.1.0 with a consequent railway deficit of £30,818. Both exports and imports fell and on this sad note, the Second World War began. The war years are included in the study since they provide a unique opportunity to examine rail transportation patterns with an over-supply of freight, elimination of road competition and the extreme difficulty of obtaining coal and replacements. The period itself is not ideal for comparative purposes, because the war produced distortions, but it gives some idea of the economic and social consequences that result when a country's main transport mode is subject to war conditions.

On the outbreak of war, the General Manager of the railway assumed the office of Director of Transportation responsible for all forms of internal transportation including the distribution of vehicles, spares and petroleum products. Road transport was mainly concerned with serving military needs while the railway was charged with the movement of all import and export goods, and at the same time was obliged to make available a large proportion of its capacity for the war effort.[16] The railway was unable to cope with all the traffic especially with that resulting from the increased production

of chrome ore. Traffic problem became so acute particularly in the Freetown area where the war had concentrated a large labour force, that 3rd class passenger fares were raised by 50% to restrict travelling. By 1942, war demands on the railway had exceeded all expectations and with limited and deteriorating locomotives and rolling stock, the railway sacrificed the transportations of palm kernels that were piling up with buying agents in the Protectorate. The tonnage of rice and number of cattle railed showed an unprecedented increase. Prior to the war, the railway only carried 30-40 cattle per month whereas by 1943 it was carrying 1,100. The freight pattern by 1942 was clearly a predominance of food products in the down traffic and war materials in the up traffic; both export and import goods were on the decline. Despite these abnormal conditions the railway showed a profit for 1941 and 1942 with a big increase in the total tonnage of freight handled. Traffic pattern however changed by 1943 when the French West African dependencies joined forces with the Allies. Demand on the railway was eased and greater attention given to the transportation of export produce. With the closing of service camps, total railway tonnage declined (Table 4.4) and the railway reverted to its usual deficits.

TABLE 4.4 RAILWAY OPERATION 1939-1945 in £s

Year	Freight Tonnage	Expenditure	Revenue	Deficit	Surplus
1939	79,658	207,094	193,647	13,447	-
1940	82,676	200,243	189,207	11,036	-
1941	101,757	231,897	249,839	-	17,942
1942	112,869	276,548	302,936	-	26,388
1943	114,852	357,861	311,517	46,344	-
1944	102,858	411,787	363,181	48,606	-
1945	96,516	558,195	359,139	199,056	-

Passenger Traffic

A comparison of passenger and freight trends over the period 1920-1946 shows that passenger traffic is more sensitive to variations resulting from economic changes and road competition. Fig. 4.4 showing trends in passenger traffic in a number of selected stations for the years 1925, 1930, 1937 and 1945 is an attempt to portray passenger fluctuations as a response to specific socio-economic changes. The 1930 slump inflicted a severe overall decline in passenger traffic, especially in the entreport city of Freetown; and the less agriculturally productive northern stations where an average decrease of 28.9% occurred. Least affected were the main palm kernel stations of the south-east with an average 15.6% decrease. At the peak of the trade boom in 1937, all stations registered impressive increases, the only peculiarity being Makeni with the small increase of 13.6%. This was due mainly to intensive road competition diverting passenger traffic from the railway. By 1945 passenger traffic showed an overall decline compared to 1937. Freetown and Songo, because of the war-time necessity for the concentration of a large and mobile labour force in the Colony, registered substantial increases. For provincial stations, a decrease was to be expected, since train services in the area had been severely curtailed to meet the needs of the Armed Forces in the Freetown area. Such fluctuations are better appreciated when compared to freight trends. By 1942, passenger traffic had increased by 192.6% over the 1937 level, but in 1945 had fallen to 50.9% of the 1942 level. Freight tonnage increased in 1943 by 89.4% over 1937 and by 1945 had declined to only 80% of the 1943 level. Clearly passenger traffic is much more sensitive to socio-economic changes.

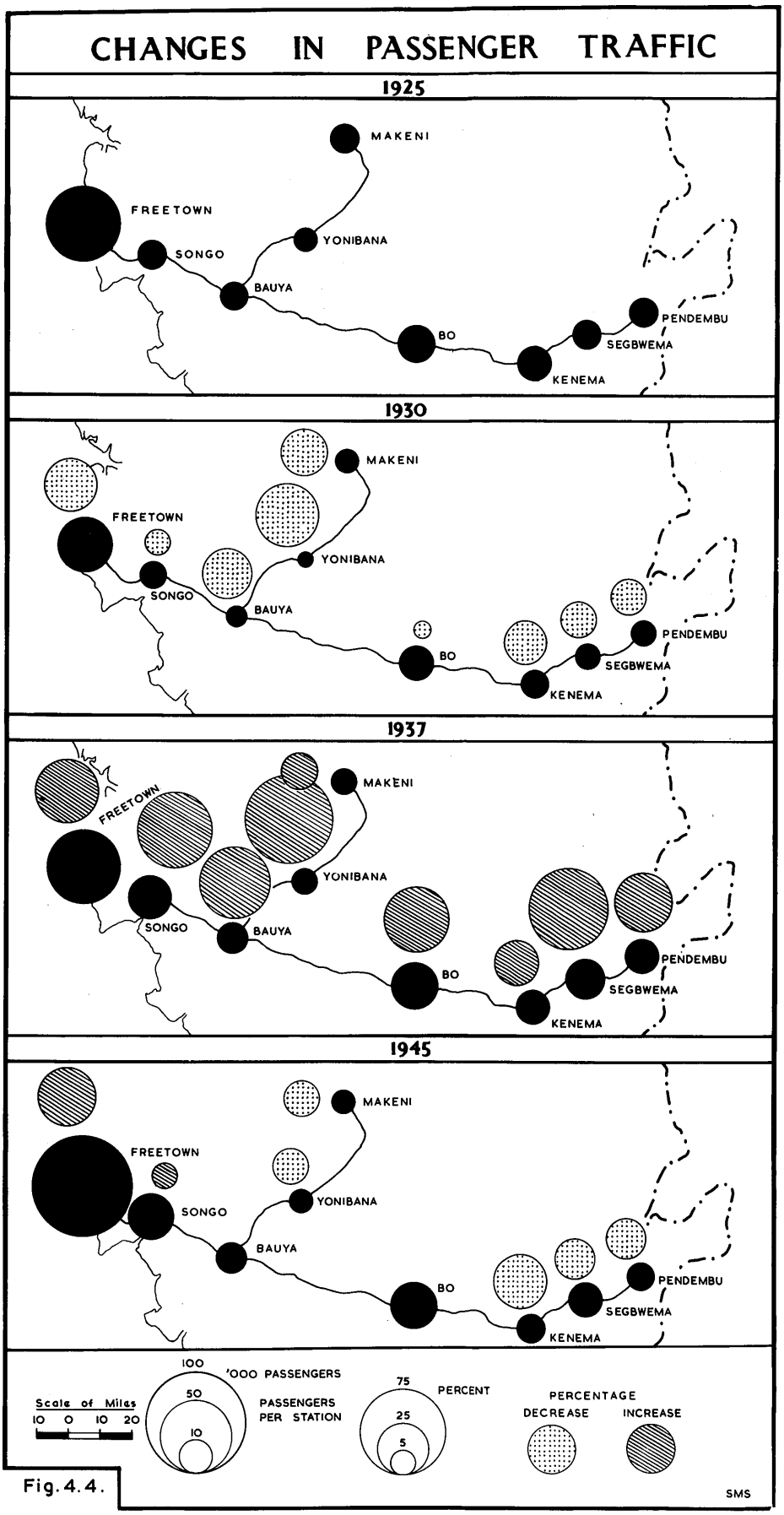
CHANGES IN PASSENGER TRAFFIC
1925
MAKENI
FREETOWN
YONIBANA
SONGO
BAUYA
BO
PENDEMBU
SEGBWEMA
KENEMA
1930
MAKENI
FREETOWN
YONIBANA
SONGO
BAUYA
BO
PENDEMBU
SEGBWEMA
KENEMA
1937
MAKENI
FREETOWN
YONIBANA
SONGO
BAUYA
BO
PENDEMBU
SEGBWEMA
KENEMA
1945
MAKENI
FREETOWN
YONIBANA
SONGO
BAUYA
BO
PENDEMBU
SEGBWEMA
KENEMA
Scale of Miles
10 0 10 20
100
50
10
'000 PASSENGERS
PASSENGERS PER STATION
75
25
5
PERCENT
PERCENTAGE
DECREASE
INCREASE
SMS

Fig. 4.4.

The last two years of the war saw a gradual decline in both passenger and freight traffic, a decline that was to continue in the post-war years. The cessation of hostilities left the railway in a most depressing state. Track conditions were very unsatisfactory; locomotives and rolling stock were insufficient and inefficient. The future presented great doubts as to the railway's ability to serve the needs of an expanding economy. By 1946, after almost 50 years of contributing effectively to the economic and social development of Sierra Leone, the railway was reduced from a position of pre-eminence in the transportation field to one of two forms competing strongly for the haulage of the country's internal and external trade. In short, the railway entered the post-war era unfit to play a dominant role in the unprecedented economic expansion that was to follow.

The Railway Today

The post-war period brought many changes with far reaching effects on the social and economic development of Sierra Leone. Prior to this period, economic activities and marketing processes showed broad geographical concentration. Such concentration, especially the distribution and marketing of export crops, was to a large degree, a factor of railway development. The railway, through the insistence of Governor Cardew, was pushed on to the South and Eastern Provinces to tap the wealth of the rich palm belt. Consequently, the latter introduction of other cash crops like cocoa and coffee in the same area was justified on the economic grounds of utilizing the already established transport mode to optimum capacity. Urban centres that grew in the railheads became important commercial areas and transport foci serving a wide but

poorly accessible hinterland. At this period, demand for transport services was limited and the railway generally fulfilled the needs of the socio-economic complex which was nicely concentrated in its immediate hinterland.

The post-war era, especially the 1950's, introduced new geographical patterns whose ultimate result was a definite dispersal of economic activities and the emergence of new demographic and urban concentrations. Such dispersal had little impact on the traditional cash crop areas, as seen by the commercial prosperity and physical expansion of the towns in the area. In other areas, the impact was tremendous. By the early 1950's, the indigenous population participated for the first time in the diamond mining industry, and the resultant trade boom precipitated a population migration to Kono which helped to establish and consolidate new geographical patterns. Derived wealth from mining provided a basis for the growth of prosperous commercial centres and the increased purchasing power, coupled with a very rapid turn-over in commerce, led to the ultimate displacement of the railway as the main transport mode. Road transport is more suited to satisfy the needs of dispersed economic activities with a national market ready to avail themselves of the "good things of life", and a population reluctant to participate in what is now considered the "unrewarding toil of farming", in contradistinction to the "Eldorado of diamond mining". With increasing gross national productivity, the demand for transport services rose, but the railway could not benefit from this boom since it had failed to reorganize and cater for a national freight market oriented to distributing a wide variety of goods to a scattered market, instead of the traditional pattern geared to the bulk movement of low value export commodities.

Pattern of Railway Freight 1950-64

Based on the classification of commodity shipment from each station, very clearly two commodities, palm kernels and other merchandise (mainly imported goods) dominate in the total freight pattern. Local foodstuff comprise the greatest proportion in only 11 stations, 9 of which lie in the western half of the line and are principally geared to supplying the urban complex of Freetown. The other two, Levuma and Tabe are properly within the hinterland of Bo. Mineral ores, timber and cattle are dominant only at one station each, while local rice is dominant in 3 stations. Clearer still is the increasing imbalance between the branch and main lines, a factor rooted in geographical realities like cash crop production and greater population densities in the hinterland of the main line. The branch line is today withering further because of intensive post-war road competition.

Regional differences in the degree of economic activity are emphasized by the gross pattern of commodity flow shown in Fig. 4.5 for the period 1961/62. The map has been compiled from a station to station origin - destination matrix (1961/62). Because of the very great tonnage variation, a scale increasing in a geometric progression had to be employed to accommodate the great difference in volume of flow over different sections of the line. Freight traffic has been divided into an "up traffic" section, and a "down traffic" section. As can be seen, the Freetown area and eastern stations have the heaviest import and export traffic flow respectively. On the down traffic, Pendembu (export crops) and Hangha (mainly chrome ore) dominate the flow pattern; while Bo, Blama and Kenema, traditional collecting centres

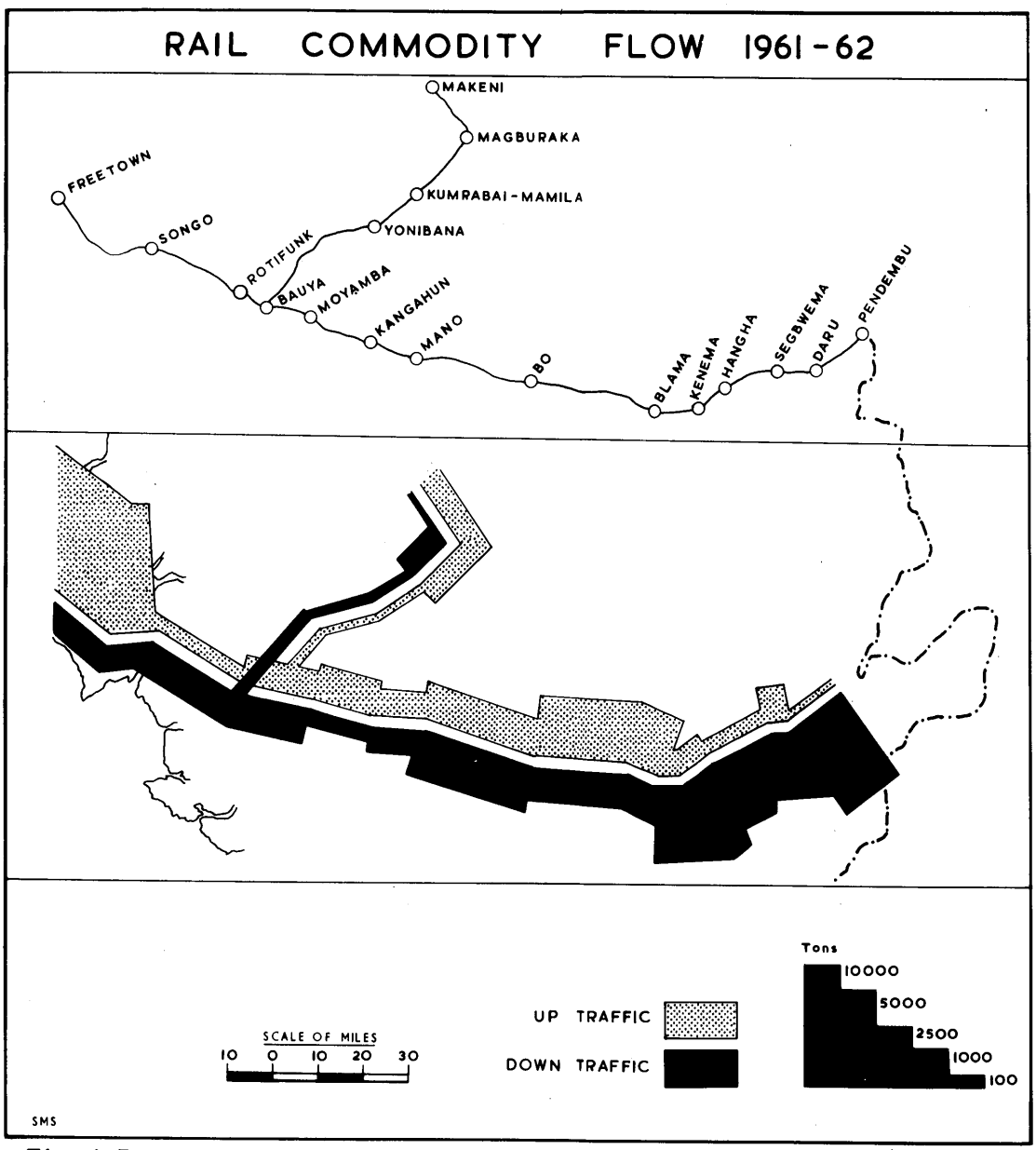
RAIL COMMODITY FLOW 1961-62
MAKENI
MAGBURAKA
FREETOWN
KUMRABAI-MAMILA
SONGO
YONIBANA
ROTIFUNK
BAUYA
MOYAMBA
KANGAHUN
MANO
BO
BLAMA
KENEMA
HANGHA
SEGBWEMA
DARU
PENDEMBU
SCALE OF MILES
10 0 10 20 30
UP TRAFFIC
DOWN TRAFFIC
Tons
10000
5000
2500
1000
100
SMS

Fig. 4.5.

for export produce, are significant contributors. Similarly, with the exception of Freetown; Bo, Blama, Kenema and Segbwema absorb virtually all the up traffic flow (import goods) on the main line, stressing the strong demand exerted by these inland urban centres and the way they function as distribution centres for large and relatively rich hinterlands to the south, north and north-east, and these hinterlands often extend well beyond the political frontier into north west Liberia and south-east Guinea. Segbwema and Kenema are interesting in that their prosperity is closely tied with that of the diamond mining industry whose needs they exist to serve. On the branch line running through the less prosperous Northern Province, commodity flow in both directions is but a fraction of that in the main line. Intensive road competition in the north, facilitated by the shorter and more direct road link with Freetown, is a factor that strangled rail demand and produced the absurd situation where Makeni, the provincial capital and most important commercial centre, has a gross total of only 234 tons of freight (1961/62). Perhaps the peculiar weakness of the branch line is to a large extent a factor of road competition.

A significant trend noticeable on the railway in the post-war period is the change in freight pattern. Since the railway was built primarily to exploit export crops, it was not surprising that, in the early years, the bulk of freight was composed of such produce, with palm kernels accounting for over 30% of the total. But today its freight pattern is dominated by import goods. Fig. 4.5 illustrates the changing freight trend emphasizing the fact that from 1954, import goods have increased their share of total freight at the expense of export produce. It must be mentioned that the

diagram is not a true representation of import and export freight. Up traffic and down traffic have been equated with import and export freight respectively, leading to the inevitable neglect of local freight traffic. However, this is not very significant since local traffic is small, most being carried by road and water transport. A detailed breakdown of the 1961/62 freight confirms this observation since 70.4% of total tonnage represents imports; 18.6% exports and 11% represents local traffic. The situation of the railway is made worse by severe inter-modal competition, in the form of road transport not only in the traditional railway monopoly of export produce, but much more so in the high rated import goods. What is left for the railway is low value bulky freight, with a preponderance of imports leading to the uneconomic situation where the railway is faced with ever-increasing empty running on the down traffic. A glance at the rather incomplete figures for 1963 and 1964 emphasizes the freight imbalance (Table 4.5)

TABLE 4.5 RAILWAY FREIGHT TYPE 1963-64

Commodity	1963		1964	
	Export Tonnage	Import Tonnage	Export Tonnage	Import Tonnage
Building Materials		18,203		10,481
Kerosene		12,905		1,803
Motor Spirit		21,680		1,562
Cement		3,363		2,502
Kola Nuts	558		96	
Palm Kernels	52,787		7,306	
Cocoa Beans	3,252		3,250	12,878
Gas Oil		131,787		12,878
Coffee	3,895		4,513	
Rice		20,817		5,407
Total	60,492	208,755	15,165	34,633

Source: Project for Improvement of Sierra Leone Railway p. 27. 1964.

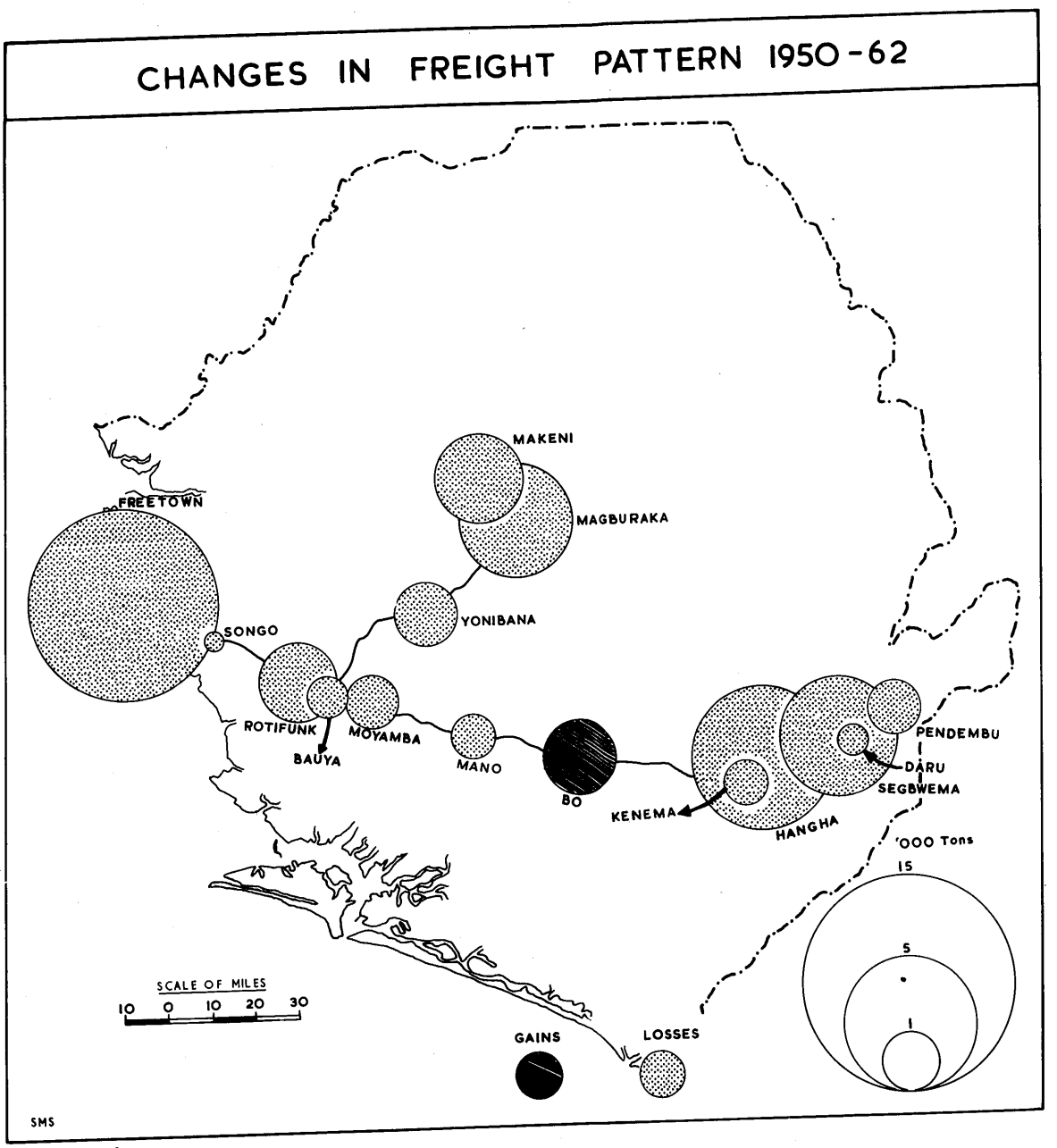
CHANGES IN FREIGHT PATTERN 1950-62
MAKENI
MAGBURAKA
FREETOWN
YONIBANA
SONGO
ROTIFUNK
BAUYA
MOYAMBA
MANO
BO
KENEMA
HANGHA
PENDEMBU
DARU
SEGBWEMA
'000 Tons
15
5
1
SCALE OF MILES
10 0 10 20 30
GAINS
LOSSES
SMS

Fig. 4.6.

As seen in Fig. 4.6 nowhere is the decrease in import freight more prominent than in the Freetown area, a factor attributable to road competition. Areas subject to severe road competition and a heavy reliance on agricultural production, exhibit greater proportion of freight decline. This is well illustrated in the three northern stations of Makeni, Magburaka and Yonibana, where better road accessibility to Freetown has diverted a substantial proportion of railway freight. In contrast, stations west of Bo as far as Bauya, despite the general decline in export crops, particularly palm kernels, have shown a smaller proportion of total freight decrease mainly due to the less severe road competition in the area.

The eastern stations can be conveniently categorized into two groups. The group of least decrease comprises Kenema and Pendembu, areas of intense economic activity. Though Kenema has witnessed a progressive decline in export freight especially palm kernels, the great demand for imported goods generated by diamond mining, has increased the up traffic tonnage to such a level that decrease in total freight tonnage, despite intense road competition, is insignificant. Pendembu's small decrease is due primarily to the fact that being the focus of cash crop production, it still has a high tonnage of palm kernels on the down traffic. On the other hand, Segbwema and Hangha provide instances of great freight decrease. The Hangha situation is simply a factor of cessation in chrome ore production, while Segbwema, once an important entreport for the Kono diamond area, has today lost to road transport and has not seen a profitable increase in import freight to offset the decline in palm kernel tonnage. Lastly, Bo provides a peculiarity in freight trends inthat it is the only station

to show a net increase over the period 1950-62. Again the pattern of Kenema is intensified here - a great decline in palm kernel tonnage but a more than proportional increase in import freight tonnage.

The above observations from the origin - destination matrix provide some basis for meaningful generalizations in relation to railway freight. All stations except Pendembu have registered substantial decreases in the tonnage of palm kernels hauled: such decreases generally vary directly with the degree of road accessibility in any one area. Changes in the shipment of local foodstuff have also shown a decline, mainly attributable to road transport; but the present pattern exhibits a marked departure from the pre-war polarization towards Freetown; now it is mainly localized short hauls serving the immediate urban centres. The increase in building materials and cotton piece goods is to an extent, a reflection of the country's commercial structure. The former is mainly a monopoly of the few big commercial firms relying primarily on the railway for the haulage of such bulky freight. These firms have not joined the popular trend in diverting this freight to road transport and, on a simple cost basis, railway haulage is still cheaper. On the other hand, the distribution of cotton piece goods is in the hands of a multiplicity of small traders who have progressively changed over to road transport. Because of its high unit value, it can withstand higher road transport charges. Furthermore, most of these retailers own lorries and since they rely mainly on small freight shipments with a rapid business turn-over, lorry transport is the ideal mode. One can reasonably extend these conclusions for cotton piece goods to cover the vast majority of imported commodities. This leads to

the further conclusion that with the increasing withdrawal of European commercial firms from the provinces, leading to the increased spread of small-scale retail traders, even the present increase in up traffic is likely to be depressed; for the magnitude of the dominant business is not conducive to rail transportation.

Passenger Traffic

In the post-war period, passenger traffic has generally shown an upward trend and some sections of the line have actually experienced big increases. Although passenger traffic has, like goods traffic, suffered from road competition, this has not prevented some small growth. Perhaps the demand for passenger service is so high that the railway, with its lower rates, can still attract a substantial number of passengers. A count of passengers indicates that the greatest concentration of passenger traffic is in the commuter area Freetown - Songo and in the area Bo - Segbwema. The former provides a market both for the latter's surplus labour and agricultural produce. The Bo - Segbwema concentration is partly a product of poor road accessibility, and partly a result of Segbwema being a transhipment point for railway passengers continuing their journey to Kono by road.

Despite the general upward trend, increases have occurred only with 3rd class passengers who also provide over 95% of total passenger traffic. The high rated 1st and 2nd class passenger traffic has virtually disappeared partly due to commercial road transport competition, and partly to the recent trend in private car ownership. This leads to the fact that passenger revenue collected is not proportional to the volume of passenger traffic.

To correct this imbalance, it is strongly suggested that the rates be revised to allow the increasing passenger traffic to carry its share of expenses. The future of passenger traffic is rather hard to predict, but one estimates that by 1980, when most of the proposed roads are completed and bus services introduced everywhere, the need for a rail passenger service will no longer be necessary. On the other hand, should the road programme fall short, and the present government attitude towards the railway actually lead to its modernization, then passenger traffic, based on the present trend, will jump the 3,000,000 mark by 1980. This seems rather unlikely for reasons to be advanced in later sections of the thesis.

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16. Best, J.R. op. cit. p. 91.

CHAPTER 5

DEVELOPMENT OF THE ROAD NETWORK 1895-1960

Despite a long tradition of trading activity in Sierra Leone between European powers and West African peoples, little or nor attempt was made to construct and maintain trade roads. In Nigeria and Ghana, the situation was the same. This could best be explained by the fact that trading activities were for a long time concentrated upon coastal forts and river "factories". To link these with the hinterland, well-worn tracks evolved and the most important ones, for example the Falaba to Port Loko road,[1] might be cleared occasionally, but even this crude form of maintenance was haphazard and liable to stop when communal labour along the routes became lax or disorganized, as a result of the frequent tribal wars. The year 1787 therefore marked an important phase in the development of Sierra Leone's early transport network, for at that time a narrow strip of land about twenty miles square was bought from the Temne chief, Naimbana, and formed the nucleus of the colony of Sierra Leone.[2] It was in this year that real colonization, by freed slaves, started. For the first time, systematic development under a central authority, was experienced in this coastal area, which inevitably became the nucleus of the country's transportation complex.

Road Development in the Colony

The need for effective colonization made it quickly apparent to the early settlers that better communications were needed, not only to facilitate trade but also to ensure political control. As a result there was an early

premium put on the development of roads in the colony. Since at this period the colony had few resources of its own and relied almost entirely on Parliamentary grants-in-aid which were scarcely sufficient to meet the colony's social and economic needs, a road tax was instituted and the Governor and Council ordered on October 10, 1795 that:

> "All male settlers within the said Territory of Sierra Leone, from the age of sixteen shall be liable to be called upon for six days of work in the course of a year for the clearing and keeping in order the streets and roads within the said territory; and in case any person so liable to be called upon, shall neglect or refuse to obey summons of the Overseers of Roads (to be hereafter appointed) every person so offending shall be fined in the sum of one Dollar: and all female Settlers being in possession of a Town or Farm lot shall be liable to be called upon to send a man to work six days in the course of a year and shall be liable to the same fine of one Dollar in case of neglecting or refusing to obey the summons of the overseers as before mentioned".[3]

Roads within the colony settlement were developed mainly in this fashion until 1872 when the Road Tax was abolished by Governor Pope Hennessy. The tax itself was modified several times to make it more effective; for example, the Highways Act of 1856 prescribed a road tax of one shilling and six pence per annum per head for all inhabitants between the ages of sixteen and sixty, with the alternative of working on road maintenance for

six days per annum. According to the reports of the Surveyor of Roads, it seemed that the road tax was sufficient to build and maintain roads, but was inadequate to meet the repair of bridges. Hence not infrequently, the Governor and Council were found voting specific large grants for the construction and repairs of bridges.

The road tax ceased to be of any importance in 1872; but in estimating the factors in the general development of the colony, there is no doubt that it made a fundamental contribution. Primarily, it was a useful fiscal device for, with the growth of population, the tax returns were bound to show a proportionate increase. In relation to the total revenue, the contribution of the road tax was indeed small; but it held the promise of growth and from Table 5.1, it can be seen that it did grow from 1856 to the time of its abolition in 1872.

TABLE 5.1 ROAD TAX RETURNS: 1856-1870 (Colony of Sierra Leone) IN £s

Year	Road Tax	Total Revenue	Road Tax as % age of Total Revenue
1856	126. 0.6	29,225.15. 7	0.43
1857	38.19.0	33,067.17. 3½	0.11
1858	191.16.6	30,681. 5. 4½	0.62
1859	125.11.0	31,432.11.11	0.40
1860	150. 1.6	33,734. 9. 8	0.44
1861	166.19.0	36,461. 4. 2¾	0.45
1862	466. 8.6	37,355. 9. 9	1.25
1863	715. 3.0	47,335.11.11	1.51
1864	639.10.0	49,113.10. 1	1.30
1865	455. 5.0	46,405. 2.10	0.98
1866	443. 8.0	58,889. 5. 0¼	0.75
1867	431. 9.6	55,808.15. 4	0.77
1868	357.19.6	56,907. 5. 9	0.63
1869	360. 4.6	69,004.10. 1	0.52
1870	484.14.6	67,135.12. 1	0.72

Source: Blue Books: C.O. 272/52-56.

In the absence of such a road tax, it would have been impossible for the settlers to develop such an early network of streets and all-weather roads. Hence one would question the economic rationale behind Governor Hennessey's abolition of the Road Tax in 1872; for even if there were available fresh sources for making good the financial loss to the revenue, road maintenance was bound to prove more expensive and the new-found revenue would only employ a smaller labour force on the roads; for the fine of 1/6 which defaulters had to pay represented only two days work

at the current official daily wage of 9d. and was thus unjust. Pope Hennessey's abolition thus deprived the colony of its more economical six days labour on the roads which in financial terms represented only 1/6, and substituted a more expensive system where six days labour now represented 9/-. It was this realization which was the main motive in reimposing the road tax as was clearly stated by Governor Rowe: "it was not the money that was wanted but the labour on the roads".[4]

At this period, colonial policy aimed mainly at containing the settlement within the confines of the colony area which meant that no roads were constructed to link up with the hinterland. In its political context, this meant that the colony and the tribal hinterland areas (later to become the Protectorate of Sierra Leone), were considered two separate political entities. This separation, in the form of a purposive political frontier, would have been an effective barrier to the social and economic interaction of the two peoples[5] - interior tribes and colony settlers - if the Colony itself were a viable political entity. This was surely not the case. Contact was effected in the form of limited trade in gold, ivory and hides; and gradual but persistent British attempts to establish the Pax Britannica over the tribal hinterland by means of peace treaties. But the most dramatic social contacts were manifested by a series of wars waged by the tribes immediately bordering the colony against the settlers. Prominent among these were the Temne and Loko of Koya who waged two important wars against the settlers. Their defeat in battle did not provide sufficient guarantee for the colony's future safety and in 1878,

at the conclusion of the Second Songo War, a strategic road was cut from the colony to Mabang, to facilitate the movement of troops in the attempt to pacify the restive Temne of Koya. This road, constructed out of pure military necessity, was the first major road link between the colony and the hinterland.

Protectorate Roads

The year 1896 marked an important stage in the development of Sierra Leone's early transport system, for at that time, a British Protectorate was established over the whole of the tribal hinterland,[6] which now experienced the effect of a central authority, and administrative districts were set up under British District Commissioners. As the British established political control over their new territory, it became apparent that a better transport network was needed. In the first place, chiefs were encouraged to maintain the trade routes regularly so as to facilitate the flow of trade, and secondly, an administrative network of hammock tracks was cleared to enable District officers to be transported from village to village slung in a hammock between two bearers. It further allowed the Frontier Police to carry out speedily their duty of maintaining law and order. The result was that between 1890 and 1906, the old north-east south-west trade route alignment had been strengthened by a few well maintained tracks, while a subsidiary network of trails had been cleared between administrative centres and the more important settlements. It is not clear whether the two types of route represented a definite trunk and feeder pattern, though the hammock trails did help to feed the main trade

routes, but the clearing and maintenance operations that sustained such a system,[7] represent a marked improvement over the former indifferent attempts.

Before considering the tremendous impact of the railway on road building, a look at the road network and patterns of commodity flow would seem useful, as they constitute a last look at the old days of trading. With the beginning of the 20th century, Sierra Leone entered a phase of economic growth that revolutionized the old transport network. A striking feature of the roads constructed by the colonial administration in the pre-railway era was that they primarily had administrative or military functions. None were constructed as media of economic development. The administration relied mainly on voluntary local labour for the construction and maintenance of these roads. Trade patterns consequently showed no alteration from the pre-Protectorate days; the old commodity flow pattern was still strongly in evidence, and the limitations imposed by an over-dependence on water transport continued to influence the range of trade goods and the profitable margin of exploitation for each commodity. Goods with a low value/weight ratio like timber and palm kernels were severely restricted to the immediate hinterlands of navigable waterways, and their movement on the roads involved only short distances. On the other hand, commodities with a high value/weight ratio, like gold, ivory and hides, because they could withstand the high costs of headporterage, had a profitable margin of exploitation that extended far into the interior.

There was at this period a very high premium put on the space dimension in the pattern of commodity flow-indicating not only an undeveloped economy but also a very rudimentary transport system, unsuitable for the extensive exploitation of bulk commodities.

Feeder Roads

The coming of the railway emphasized the need for a flexible feeder system that would channel traffic to the various railheads and thus, create a regular and reliable supply channel for the economic running of the new railway. This need was met by roads. So important had become the need to build feeder roads that the central government actually spent £882 in 1904 on road construction.[8] Two main bodies were responsible for the construction of these feeder roads. The more important was the Railway Department itself, acting as an agent of the central government, which constructed all the 1st class roads while the chiefs, under the supervision of District commissioners, constructed the 3rd class roads, and on their own, made all the 5th class roads. The distinction among the three classes of roads lay in their respective quality. By 1906 there were 59 miles of 1st class roads constructed at a cost £20,650; 50 miles of 3rd class roads constructed at a cost of £3,750, and 71 miles of 5th class roads built at the small cost of £1,775.[9]

An important feature of almost all these roads especially the 1st class roads, is that they generally run due north at right angles to the railway as shown on the 1910 Road Map (Fig. 5.1). There were hardly any roads running south since in the Southern Provinces, roads were considered inessential because the navigable waterways were sufficient to handle

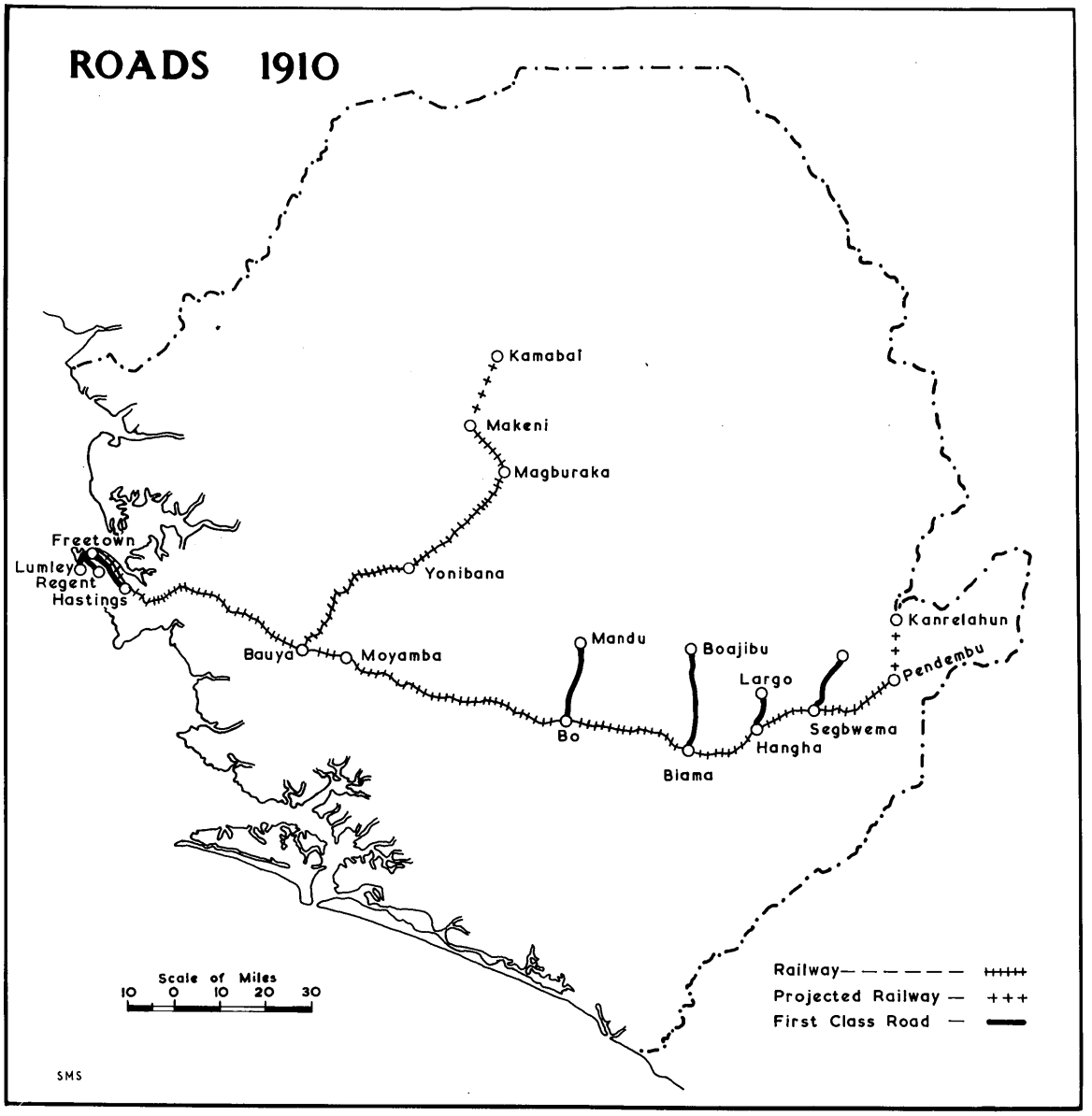
ROADS 1910
Kamabai
Makeni
Magburaka
Yonibana
Freetown
Lumley
Regent
Hastings
Bauya
Moyamba
Mandu
Boajibu
Largo
Segbwema
Kanrelahun
Pendembu
Bo
Hangha
Blama
Scale of Miles
10 0 10 20 30
Railway
Projected Railway
First Class Road
SMS

Fig.5.1.

the available traffic. There was no immediate need to divert such traffic to the railway. The alignment of the roads was dictated by the economic necessity to pass through the rich palm belt; hence purely physical factors of terrain and drainage were made subservient to the all important economic factor in the location of roads. The roads had to run through difficult and broken country necessitating the construction of huge embankments, and cuttings with numerous bridges averaging one bridge for every 1¼ miles of road.[10]

The geographical distribution of roads in this period showed the early dominance of the eastern palm belt region. The road Map of 1910 clearly indicates the concentration of all 1st class roads in the area running from Bo eastwards to Segbwema. In the north, there were no 1st class roads and in the extreme south, where water transport was still of major significance, such roads were also lacking. Of the 60 miles of 1st class roads, 19 linked the Hangha railhead with Largo, and 11 ran from Segbwema due north towards Bunumbu. There were 14 miles of good 3rd class roads linking Penedembu with Kanrelahun on the Guinean frontier, - an important route for trade with the Kissis of what is today the Republic of Guinea. In the north, there were 46 miles of 3rd class roads radiating mainly from the railhead at Yonibana. Of the 200 miles of 5th class roads, the majority were in the eastern palm belt.

Despite the penetration of the railway into the palm belt and the rapid spread of a feeder road system, it was realized that the system of head porterage was not only inefficient as a means of moving low value

bulk commodities, but employed a substantial labour force which would otherwise have been used in increasing production. Several attempts were thus made to release this labour force and substitute it by other transport means. Animal transport was tried using donkeys imported from the Gambia and bullock wagons, but both failed. Barrel rollers especially in the eastern palm belt were extensively used; their success as a substitute for human carriers was rather marginal, since it took about the same number of men to roll a barrel of palm kernels as it took to head load it. Tramlines provided a more useful answer to the problem, and so successful were their operation that some of the earlier feeder roads, like the Hangha-Largo road, were converted into tramlines. However, head loading continued to dominate the flow of produce to the railheads until the year 1910, when the Public Works Department (PWD), now Ministry of Works, took over the running of the 1st class roads from the Railway Department, and the first motorized transport, in the form of a lorry, was introduced on the Protectorate roads.[11]

With the Public Works Department taking over, road building was now accelerated and the roads which had been converted to tramlines by the Railway Department were taken over, and reconverted into 1st class roads capable of handling motor traffic. By 1913, the need to pursue a more vigorous road policy in the Protectorate led to the formation of a Protectorate Road Department, charged with upgrading 3rd class roads into 1st class ones, and extending the road network as rapidly as funds became available. This new department hardly had time to organize a comprehensive road policy when hostilities broke out in 1914.

Growth of Roads: 1914-1939

The war had an immediate impact on the national economy. Total trade declined throughout the war period, and exports declined some 27% in value; despite great efforts to revive it after the disastrous submarine warfare, the highest level of trade during the war period was still 10% lower than the 1913 peak, as can be seen in Table 5.2.

TABLE 5.2 VALUE OF EXTERNAL TRADE IN £'000

Year	Imports	Exports	Total
1913	1,750	1,731	3,481
1914	1,405	1,251	2,656
1915	1,256	1,255	2,511
1916	1,291	1,224	2,515
1917	1,533	1,580	3,113
1918	1,064	1,517	2,581
1919	2,123	2,102	4,225

Source: Trade Report 1914 p. 2.

Despite these adverse economic conditions, development did take place in the sphere of transportation. By 1914, there were 1,361 miles of road in the Protectorate. Of these 68 were 1st class roads, 81 2nd class roads and 1212 3rd class roads. Owing to the retrenchment policy and government economy measures to keep down expenditure, work on the roads was largely restricted to maintenance. From 1916 maintenance work on 2nd class roads was suspended, and new construction was limited to those roads for which

materials previously ordered, were becoming available. The maintenance of 3rd class roads was done by chiefs and their people for which government paid them an average of 15/- per mile. By 1918, the length of 1st class roads had increased to 146 miles, the policy of the government being to upgrade existing roads if new construction was not feasible. In the Colony 15 miles were so improved, both in the Colony and Protectorate several roads were made fit for motor transport. A comparison between the Road Map of 1910 and that of 1920 (Fig. 5.2) clearly shows that there was substantial progress in road development.

The execution of the First World War saw the beginning of a second transport revolution in Sierra Leone. Although the lorry was introduced in 1910 and provided the final answer to the problem of transporting produce to the railheads and the distribution of imported goods, its spread was very slow. By 1920 however, several army vehicles had been put into civilian use and many ex-servicesmen who had acquired technical training while on active service, became available to drive and properly maintain the lorries.[12] Most of the vehicles were of U.S. origin and it is therefore not surprising that the Ford truck led the way. With its high clearance, light weight body and standard parts, the Ford could travel over poor quality roads, and was easily repaired by the driver if it broke down far from the main urban centres. The impact of the lorry upon the movement of export produce was pronounced. The increasing importance of the lorry led to a boom in road construction. The chiefs and their people, as before, showed a keen interest in the construction of feeder roads. They sent a flood of petitions to District commissioners asking the government

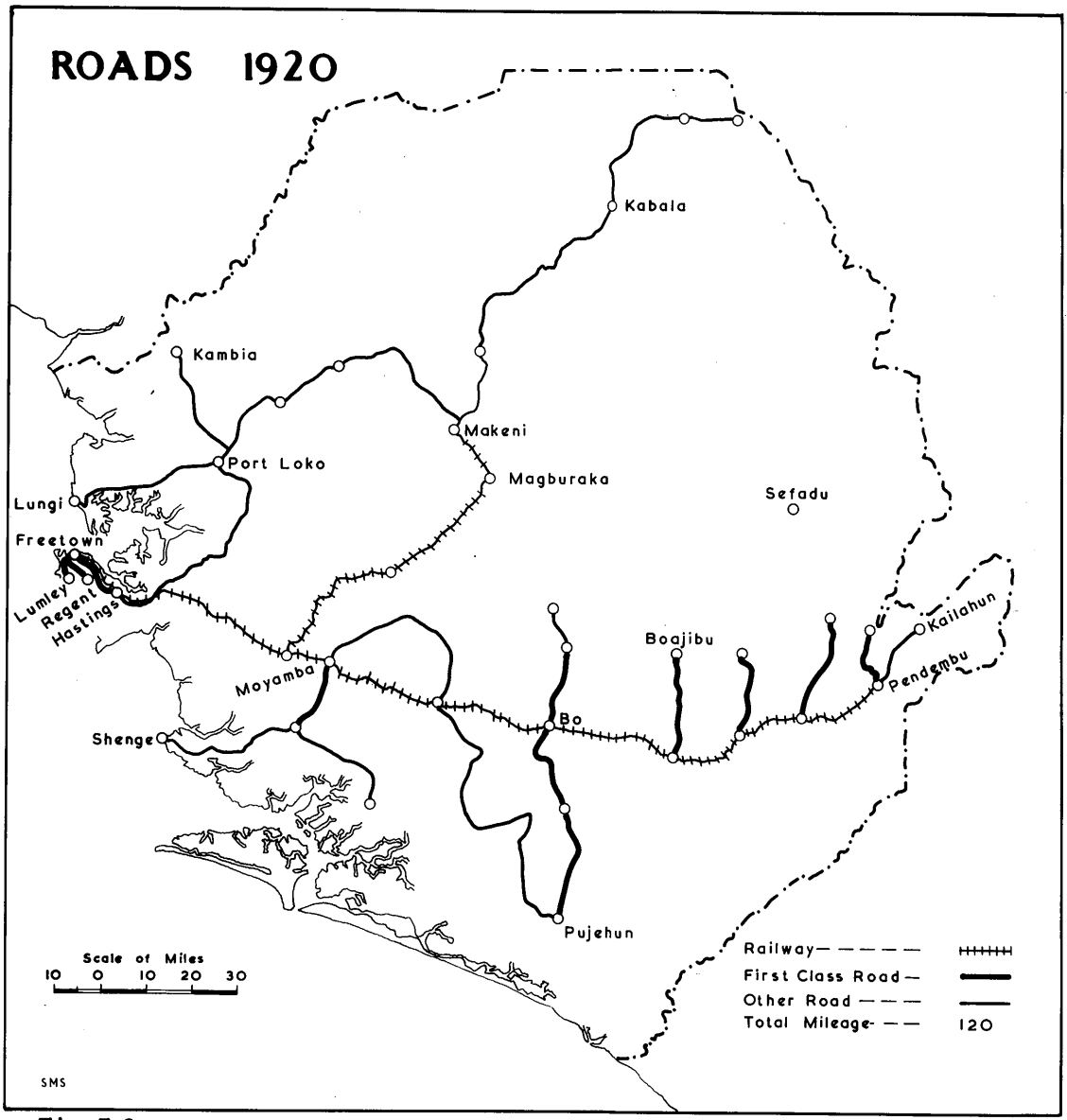
ROADS 1920
Kabala
Kambia
Makeni
Port Loko
Magburaka
Sefadu
Lungi
Freetown
Lumley
Regent
Hastings
Boajibu
Kailahun
Moyamba
Pendembu
Bo
Shenge
Pujehun
Scale of Miles
10 0 10 20 30
Railway
First Class Road
Other Road
Total Mileage 120
SMS

Fig. 5.2.

to build bridges on their roads, or to force reluctant chiefs to build their own sections of a road. They appreciated the fact that a road link and a lorry, spelt prosperity for the land by bringing them into closer contact with a wider world.

The Public Works Department spared no pains in making many roads motorable. By 1926, when the general railway strike brought an overall crippling of industry, the government started to recognise roads as an independent instrument of development. This early recognition was further strengthened by the fact that the mountainous topography of the Colony peninsula, did not provide rivers that were navigable for any considerable distance inland. Hence with a view to develop an alternative means of transport within the country independent of the railways, government appointed a Roads Board to consider and recommend a programme for the development of a road network. This Board met and approved in 1928 a Roads Programme for 150 miles of new road to be constructed by central government, and another 150 miles by local authorities.[13] The plan aimed at rapid economic growth by building better feeder and access roads linking producing areas to either ports of navigable rivers as did the Kamakwie - Kambia road, or to the established railheads. Further, it envisaged the construction of lateral road links to spread motor transport. Although the plan was never executed to its full mainly due to the vicissitudes of the 1930 depression, nevertheless, the structure of the road network was substantially altered. For the first time there was a road link between the Southern and Northern Provinces, starting from the

tidal port of Sulima in the extreme south, through Bo and Makeni, to the northern town of Kabala (Fig. 5.3). By the time the depression had actually gripped the country and paralyzed its economy, motorable roads had increased from 160 in 1920, to 704 in 1930 - over a four-fold increase in the decade.

Despite the general economic depression, road transport showed real progress. This progress can be attributed to two main factors: the road building programme started by the 1926 Surplus Balances Development programme and communal road building, especially in the Protectorate. The programme aimed at increasing the motorable roads from 400 miles in 1926 to about 850 miles in 1931. Greater emphasis was to be laid on Protectorate road development; for this vast area had only 260 miles of 1st class roads by 1926. The programme, despite the fury of the depression, continued road construction and by 1934, when government economy measurers forced construction to stop, 814 miles of 1st class roads had been built in the Protectorate alone. From then on to 1935, very little was added to the total mileage which remained at 845. In this period, communal labour was extensively used in the Protectorate, which contributed in no small measure to the scaling down of construction costs calculated at between £250 and £400 per mile.[14]

The sphere of mining showed appreciable growth in the depression years, but this growth was not associated with the development of mineral roads. The gold "rush" was unorganized and involved largely small-scale prospectors migrating from one stream to another, and depending on bush tracks and

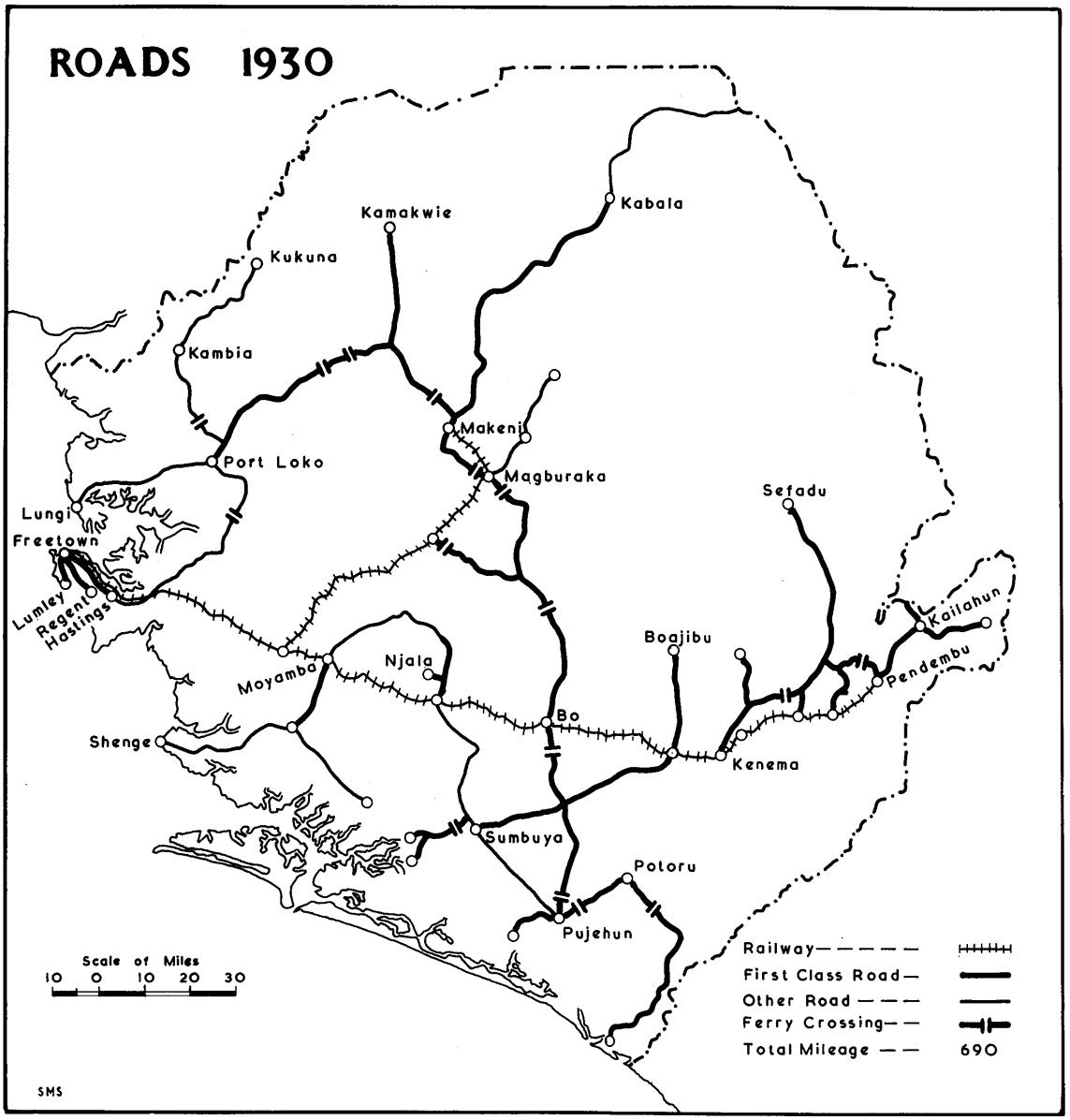
ROADS 1930
Kamakwie
Kabala
Kukuna
Kambia
Makeni
Port Loko
Magburaka
Lungi
Freetown
Lumley
Regent
Hastings
Sefadu
Kailahun
Bogjibu
Njala
Moyamba
Pendembu
Bo
Shenge
Kenema
Sumbuya
Potoru
Pujehun
Scale of Miles
10 0 10 20 30
Railway
First Class Road
Other Road
Ferry Crossing
Total Mileage 690
SMS

Fig. 5.3.

head loading to convey all their needs. The mineral itself has an extremely high value/weight ratio and as such its successful exploitation is not always dependent on the availability of either railways or motor roads. Hence the gold mining industry left no permanent traces in the field of transport development. Diamonds, like gold, have a high value/weight ratio and their exploitation is not usually dependent on the availability of an efficient transport system. Diamond mining in the Kono District depended solely on the already existing railway and Segbwema - Sefadu road link. Within Kono District itself, the early period of mining saw very little road development. As for iron-ore mining, it depended on its own mineral railway running from the mine at Marampa to the shipment port of Pepel, a distance of about 52 miles. The presence of the mine at Marampa cannot be easily associated with any direct road building programme. It can therefore be concluded that progress in road building was entirely due to the combined efforts of the central government and local authorities. Mineral exploitation, despite its great economic importance in this period, cannot be associated directly with any major road construction.

Because of increasing agricultural production to stablize total incomes and opening up of the mineral industry, there was thought to be enough freight available for all the three transport modes. In the sphere of moving mining equipment to the diamond mines of Kono, the railway had an absolute monopoly up to the railhead of Segbwema, from which point, road transport took over and continued right on to the mines. In the field of agricultural production, the railway experienced intermodal competition from the combined activities of road and water transport. In the export

sector, the predominance of bulk goods of extremely low unit value, would, a priori, make cheap water transport the user's preferred mode. The railway was economically inefficient in the sense that it was more costly than water transport, and in the depression years of declining prices, the extra income earned by the producer of water-borne export crops, especially palm kernels, where an extra one shilling per bushel was gained, was a sufficient price incentive to divert traffic from the railway to water transport. But the increasing utilization of water transport, presupposes a greater dependence on road transport to haul freight to and from the riverine ports. At this period the Protectorate roads had developed sufficient links not only to facilitate the coastwise and riverwise conveyance of export produce, but also to render such movement competitive vis à vis the railway.

The preference for road and water transport would have been greater than otherwise suggested, had it not been for the government's protectionist attitude in favour of the railway. As early as 1932, government protection of the railway had become evident[15] because the policy of creating road gaps was found to be insufficient in the face of growing competition. Road and water competition was most severe in the Northern Province, where the road system had effectively created a route linkage between the most productive areas and the river port of Port Loko, providing an alternative highway to the railway. The railway's reaction to the slump and growing inter-modal competition, was to reduce fares and rates, and to urge government to impose road tolls so as to curb the unfair and predatory competition, especially by road transport. Hence a series of road tolls

were imposed first on the Port Loko-Makeni road in the Matiki-Pamelap section in 1934.[16] This embargo had the temporary effect of redirecting northern traffic to the railhead of Makeni.

The roads were usually in a good condition, for maintenance was now by voluntary paid labour. Government was finding it extremely difficult to run and maintain the ferries whose costs had soared from £351 per ferry per annum in 1928 to £1,638 in 1931.[17] The ferries were therefore transferred to the United African Company Ltd. (U.A.C.), and this commercial body imposed heavy tolls on their use. By 1935 the government was much alarmed by the rapid commercial exploitation of the ferries which were conceived primarily as a social service, and accordingly, took over the ferries from U.A.C. Ltd. in January 1, 1935.[18] It is extremely unlikely that the economic conditions then prevailing led to any substantial increase in the lorry fleet as shown in the receipts from Motor Licences in the Protectorate which increased from £1,480 in 1931 to £1,870 in 1936.

1935-39 marked the beginning of the mining industry's contribution to road development. Such contribution operated largely through the Protectorate Mining Benefits Trust Fund and under this programme, three major roads were completed at a total cost of £10,657. Under the same programme the important Waterloo-Port Loko road, aimed at closing the road gap which had separated the Colony from the Protectorate for so long, was started, In the Colony, 27 miles of the Peninsula road were completed at a cost of £45,000. Table 5.3 gives an exact position of road development in the boom period prior to the outbreak of World War II.

TABLE 5.3 ROAD DEVELOPMENT BETWEEN 1935-1938

Road	Mileage	Cost in £s	Completed
Mabonto-Bunbuna	15½	3,371	1936
Port Loko-Lunsar	22	4,618	1937
Mano-Bumpe	21	2,668	1938
Peninsula	27	45,000	1938

Source: Public Works Dept. Annual Reports.

Road transport reacted to this economic prosperity by again posing severe problems of competition against the railway. Competition was now effectively manifested in the Southern Province especially in the movement of palm kernels. To recapture this freight, government paid a £20,000 subsidy to the railway to enable it to lower palm kernel freight rates by 15/- per ton. This price incentive was however found to be ineffective and resorting to the protectionist policy of the slump period, stringent prohibition was reapplied on the Makeni-Port Loko road in 1937, and was extended to the Mano-Bumpe road in 1938.[19] These restrictions, in a rapidly deteriorating economic atmosphere, not only halted the expansion of roads but also finally killed water transport as a major mode.

Road Development in the Second World War

The Second World War came with a sudden impact and depressed the economy just as the First World War did. Exports fell both in value and volume while imports showed an absolute increase. The effects of the war were felt in all sectors of the economy; but the strain was most severe on the transport sector. Road construction virtually came to a standstill. Road transport was entirely given over to meet military needs while the railway was burdened with the movement of all imports and exports and at the same time making available a large proportion of its capacity to the war effort. The railway was unable to cope with the traffic and road transport could not be used to ease the bottle-neck.

Road transport was mainly concerned with the movement of food crops to the Freetown area where a large number of servicemen was concentrated. Long delays and bottle-necks developed at the ferry points and for the first time, it became clear that the road network was inadequate to meet the needs of the country. The army, in a desperate need to foster a direct road link with the provinces so as to accelerate the delivery of food supplies, and also to move men and war equpment to the Protectorate, pushed through the first road link between the Colony and Protectorate. (Fig. 5.4). The road was linked to the Port Loko road at mile 47, later on in 1941, the army again constructed the Mile 47 - Kumrabai axis, thus creating a second road link with the provinces. Although the quality of these roads was indifferent, largely because of speedy construction in war time, they however closed the most important road gaps in the country and

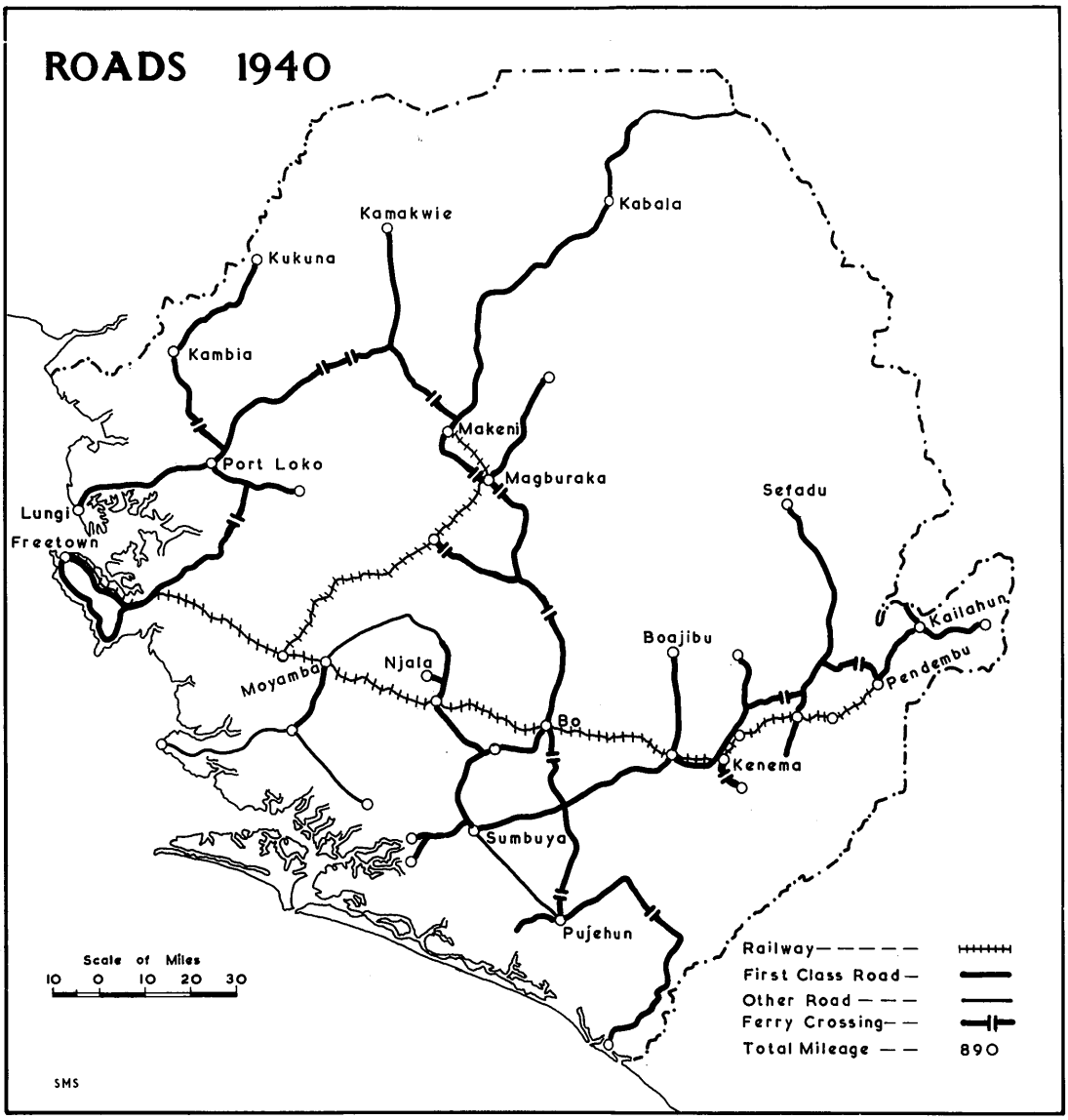
ROADS 1940
Kamakwie
Kabala
Kukuna
Kambia
Makeni
Port Loko
Magburaka
Lungi
Freetown
Setadu
Kailahun
Boajibu
Njala
Moyamba
Pendembu
Bo
Kenema
Sumbuya
Pujehun
Scale of Miles
10 0 10 20 30
Railway
First Class Road
Other Road
Ferry Crossing
Total Mileage 890
SMS

Fig.5.4.

provided a solid basis for future successful road competition. One other sphere of road construction by the military was in the rich rice growing area of Kunike; here a poor quality road was constructed from Matotoka to Makali to make available large quantities of upland rice.

Post-War Period

By the end of the war, the roads had deteriorated greatly and the railway was in an exhausted condition owing to lack of replacements. The roads, heavily used by military traffic, emerged from the war sorely in need of repairs. Road transport, because of the scarcity of spare parts and restrictions on petrol, was slow to recover its pre-war level; hence the railway alone was left to meet the transport needs of a rapidly changing economy. However as increased supplies of spare parts, petrol, oil and tyres became available, road transport recovered to assume an even more dominant position than before the war. Demobilization of a large number of servicemen released many well-trained drivers and mechanics, who quickly provided the required labour force for the industry. A booming export trade and a related prosperity in the internal economy, helped heavy local capital investment in motor transport.

These favourable economic conditions resulted in a rate of traffic growth far in excess of that previously prevailing. Many roads were constructed in the immediate post-war period to stimulate increased productivity so as to recoup the losses of an unprofitable war. All these were embodied in the 1946 Ten Year Development Plan, which envisaged improvement of the road system as the most essential of the key schemes, and therefore

gave it top priority for commencement. However, only £380,000 were allocated to road construction and improvement out of a total Ten Year Development Plan of £5.25 million.[20] Such an allocation did not portray the plan's repeated emphasis on road development for the general success of the programme. About 300 miles of road were constructed under this scheme. Of these roads, the Magburaka - Kumrabai road was of great significance since it provided a shorter route between Magburaka and Freetown by 19 miles, and by-passes two ferries. On the whole, the 1946 plan is best remembered for the roads it started and not for those completed; for example it started the Giema-Zimi road and completed a thorough survey of the Kenema-Zimi road, both leading to rich cocoa and palm kernel areas. In the Northern Province, the Falaba-Kurubonla road was started but more important, work was begun on the Limbaya-Gberia Fotombu road link with the Republic of Guinea.

In 1949 the Childs Report was published and in many respects, it consolidated and expanded the theme of the 1946 Ten Year Development Plan. This time, road development was treated more thoroughly, and the report expressed the need for two classes of roads:

> **"those which forming part of the main structure of the communications system should on account of their scale of importance be the direct responsibility of the Central Government; and those which being subsidiary to the main structure and primarily of local importance; should be decided upon, planned and carried out by the provincial and district authorities"[21]**

It recommended a five year programme of main road construction by central government totalling 57½ miles at an estimated cost of £80,000, plus a major programme for replacing ten ferries with bridges at an estimated cost of £150,000.

Road construction in the immediate post-war period thus differed both in quantity and character from the pre-war era; on the one hand the raison d'être shifted from political and military to mainly economic considerations. Increased trade activity caused by the diamond boom of the 1950s involved the increasing use of faster and heavier lorries, which inevitably produced a rapid deterioration of the laterite roads. Time lost in crossing the slow-moving ferries (Fig. 5.5) and the resultant traffic bottle-necks necessitated the bridging of such ferry points. Local government fully participated in road construction and by 1950 there were about 1414 miles of road maintained by the Public Works Department, 91 of which had a bitumen surface, and 663 miles of local government and private roads.

Road development experienced an increased infusion of capital, but the amount allocated was by no means adequate to cope with the basic road needs. Not only had large arrears in war time maintenance to be made good, but better quality roads had to be built to withstand traffic that was doubling every five years on most of the major roads, and tripling on the roads of the diamond mining areas. Outstanding achievements in road development was the replacement of about ten ferries by modern steel girder bridges, the bulk of the work being done by contract awarded to Pauling and Company Ltd. These bridges, the most spectacular of which is the Sewa Bridge

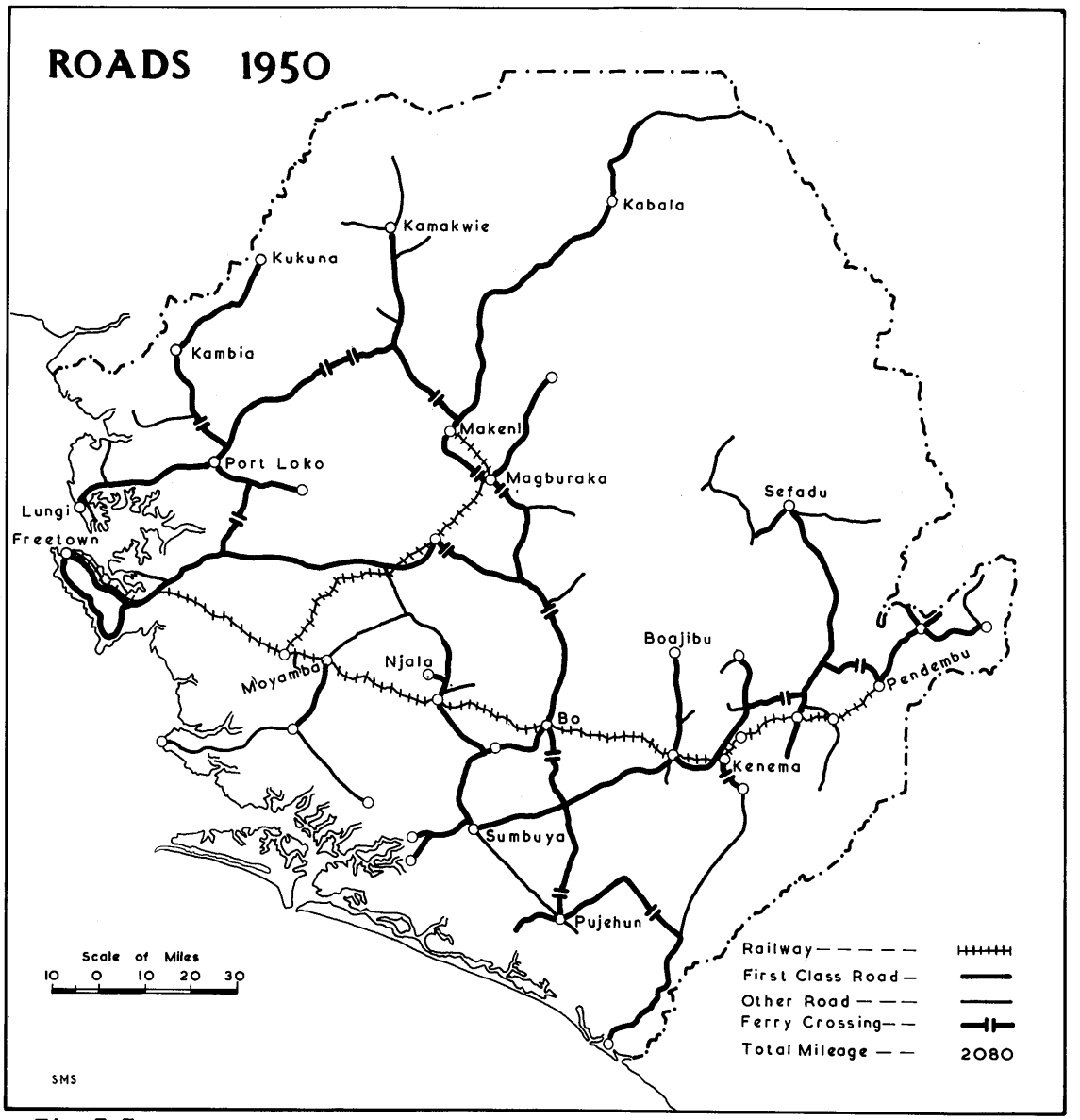
ROADS 1950
Kabala
Kamakwie
Kukuna
Kambia
Makeni
Port Loko
Magburaka
Sefadu
Lungi
Freetown
Boajibu
Njala
Moyamba
Pendembu
Bo
Kenema
Sumbuya
Pujehun
Scale of Miles
10 0 10 20 30
Railway
First Class Road
Other Road
Ferry Crossing
Total Mileage 2080
SMS

Fig. 5.5.

which is 700 feet long, being a combination of several short steel girder spans and steel truss main span, have substantially eased the ferry bottle-necks. Still about a dozen ferries remain to be bridged and the most important include the Mange and Kambia ferries, the Moa and Kumrabai which still continue to create traffic hold-ups on important major roads.

By 1960 the total road mileage of Sierra Leone comprised some 4,000 miles of which 1,700 to 1,800 were administered by the central government through the Ministry of Works, and about 1,800 miles by local government and private agencies. Construction in this period was very slow especially from 1953-1958, averaging 31 miles per annum with the exception of 1952 and 1959/60 which averaged 95 miles and 91 miles respectively. Thus road building between 1950-1960, was proceeding at the rate of 470 miles per decade. This slow progress, if continued, would take the country to have a road factor of 1 mile of road per square mile of territory, 51.7 decades. The 1961 road factor was one-eighth of a mile of road per square mile of territory. This low rate is obviously incompatible with rapid economic development, and if the 1959-60 average of 91 miles per annum were made the minimum rate, this should result in the construction of at least 900 miles by 1971/72 - a modest target for the goverument. If local authorities added another 20 miles per annum, this should give about 1,100 miles by the end of 1971.

Most new construction consisted of laterite roads, but the striking feature was the increasing cost of construction. The cost in 1960 was about double that of 1952 and triple that of 1950. Maintenance costs also

showed a great increase even though the standard was below that required. This situation was most acute in provincial roads where there were in 1961, 1,466 miles made up of 1,440 miles of laterite, and 26 miles of bituminous, roads. These were estimated to require £366,000 for adequate maintenance whereas the vote provided was only £241,000, a short fall of £125,000.

TABLE 5.4 ROAD MAINTENANCE COST

Year	Road Type	Mileage	Expenditure £s	Cost Per Mile £s
1952	Laterite	1326	120,727	91
1960	"	1578	232,250	141
1952	Tarmac	103	33,286	321
1960	"	196	90,200	460

Source: Annual P.W.D. Reports

Despite the low rate of new road construction and development, road use in the decade 1950-1960 was truly phenomenal. This trend is clearly shown by the increasing number of vehicles licensed and the increased use of fuel. The trend in fuel consumption can only give a notional idea of increased road use, since a substantial tonnage of fuel is re-exported as ships' supplies in the port of Freetown, and a large amount of diesel fuel is used in stationary machinery in industry and in the generation of thermal electricity. But the two undoubtedly provide concrete evidence of increasing road utilization in the country.

Conclusions:

This chapter spans a 160-year period of road development and throws interesting light in the historical geography of transport development in Sierra Leone. It is interesting to note that in the Colony and Protectorate, early road construction was done on a voluntary basis; in the Colony as a form of road tax and in the Protectorate by chiefdom labour. The need to link rich agricultural areas to external markets precipitated the construction of the railway in the early 20th Century to the eastern palm belt and roads developed as feeder systems linking previously inaccessible areas to the railway. As the road network expanded hand in hand with palm and food production, lorry transport was introduced. Originally motor transport was encouraged by the railway as a complementary, yet subsidiary, form of transport; but the impact of lorries revolutionized this relationship, and roads quickly rose to a prominent position. If the roads could feed the railway, they could also feed the ports and rail towns directly, and until the beginning of the Second World War, road and rail transport were competing strenuously for the carriage of the country's trade goods. In fact by this period the relative inefficiency of the railway had started to show up by the users' preference for road and water transport, and the government's attempt to protect the railway by imposing road tolls. Commercial road transport, because of the exigencies of the Second World War, was virtually wiped out; but it gradually regained its competitive position in the early post-war years. In the post-war era, great emphasis had been laid on road development and several plans have been formulated,

though financial difficulties have limited their full implementation. However, there is no doubt that by the 1960s, roads, despite their slow rate of increase, had become the dominant carriers of the import and export trade of the country, relegating the railway to a poor second position.

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CHAPTER 6

THE PRESENT PATTERN OF ROADS

Introduction

An outstanding feature of transport in post-war West Africa has been the tremendous growth of motor traffic which is reflected in road building and improvement works. Such developments include both the upgrading of existing laterite roads to bitumen-surface highways, and the construction of roads of all classes. This work has been carried out by national governments, local authorities and commercial concerns, notably mining companies. However, although road building and the motorization of road transport have been two of the most important factors in economic and social development, accurate quantitative data relating to them is hard to obtain. In fact, in Sierra Leone as in other West African countries, the paucity of information on road mileage, traffic volume and vehicle park, is a common characteristic. Even the direct benefit on trade and production attendant on improved road transport are a matter of conjecture; but there is no doubt that increased urbanization and domestic migration owe much to improved road services. The growth of road transport has inevitably produced inter-modal competition with the older established railway and waterways; such competition sometimes involves an actual diversion of traffic to the new mode, but in several instances, it has simply exploited a latent demand which was hitherto unsatisfied, owing to the scarcity of transport facilities. Roads have become, in Sierra Leone at least, the major transport arterials for economic and social development.

The exact length of the national road network is unknown. However it was estimated in 1966 to be in the region of 5,000 miles; of these, about 2,000 miles are maintained by the central government and the remaining 3,000 miles form the district council and chiefdom roads. There is a small mileage of private roads belonging mainly to mining concerns. This 1966 road mileage estimate gives 2.3 miles per thousand of population or 0.12 miles per square mile of territory, figures which compare favourably with other West African countries, but are ridiculously small in relation to a developed country like the United States of America with 19.75 miles per thousand of population and 1.16 miles per square mile of territory in 1959.[1]

Types of Road

At present, the highways have no numbering system as is the common practice in developed countries. The official classification of roads is based entirely on the various agencies under whose jurisdiction they happen to fall. Such a method is supposed also to indicate road quality and traffic density. However, observation in the field reveals that Ministry of Works (MOW) roads, which constitute the top category, do not always meet with the required criteria. For example the Koribundu-Kenema M.O.W. road is often impassable in the rainy season, and when considered strictly on technical criteria, should properly be ranked lower. On the other hand certain district council roads usually considered in the lower categories, properly belong to the top class. For example the Koidu-Yengema road is a first class highway which easily carries a traffic density of over 500

vehicles per day. Transportation Consultants Inc. of Washington in their "Transport Survey of Sierra Leone," recommended the use of three road classes: Primary, Secondary and Tertiary.[2] E. Davies in his impressive "Roads and Road Transport in Sierra Leone", suggested six road classes based mainly on established international models.[3] Both these suggestions and the present official system are not comprehensive, and do not portray a classification that reveals the realities of road conditions in Sierra Leone.

It is therefore intended to suggest another classification whose applicability, though limited to Sierra Leone, will however provide a system that reflects the true conditions of the nation's road network. To achieve this, the following criteria have been chosen:

(a) motorability throughout the year

(b) traffic density

(c) size and population of area served

(d) significance within the total road network

(e) estimates of actual and potential contribution to national development.

Using the above criteria, three classes of road are suggested.

(1) Main Roads

(a) Surfaced
(b) Unsurfaced

(2) Secondary Roads

(3) Minor Roads.

Main roads fall into two categories as seen above. They form the principal inter-urban links in the country and carry the densest traffic flows. Most of these roads coincide with the M.O.W. top category, and

hence constitute the best highways. About 300 miles of mainroad have a bitumen surface and construction costs are in the order of Le 30,000 - Le 40,000 per mile. They generally have a 20 foot carriageway with two traffic lanes and properly constructed verges, drains, cuttings and embankments. However, the majority of main roads have no bitumen surface. They are improved gravel surface roads with a longitudinal layout designed for speeds between 20 and 45 m.p.h. and the carriageway is generally sealed with laterite or clayey gravel, obtained from near the line of the road. As on the bitumen-surface roads, almost all major river crossings have been provided with permanent bridges, a feature that has greatly speeded up the flow of through traffic and eliminated the former lengthy delays at ferry crossings. These roads, given good surfacing materials like the natural lateritic gravels, can easily become all weather roads.

Many roads in this category have evolved by a process of gradual improvement. Originally their layout was casual and the cross-section was only rudimentary. The introduction of mechanical equipment in maintenance work usually leads to some improvement, but this may help to perpetuate a road on an alignment which is functionally unsuitable. It is usually at this stage of development that decisions have to be made whether to improve on existing alignments, or to build an entirely new road. In gently undulating land, the building of a laterite gravel road to main road standards involves little more earthwork than is required to build up the road formation with soil excavated from the side drains. Cut and fill necessary to provide adequate sight lines and approaches to river crossings,

tend to increase the volume of earth to be moved and the overall construction cost per mile ranges from Le 10,000-18,000. In difficult country such as swamp areas and heavily dissected hill country, construction costs are higher and are of the order of Le 14,000-22,000 per mile, especially in swamp lands where a greater thickness of gravel may be required, and suitable surfacing materials are usually rare and more costly to haul in.

Secondary roads constitute the middle category and generally have an unimproved gravel carriageway suitable for single lane traffic. Their construction is very similar to the early stages of constructing main laterite roads into which they normally develop when improved. Functionally they act as feeders to the main roads and are usually administered by local authorities. Their permanence is sometimes seasonal due to either flooding or lack of maintenance. Traffic densities on such roads are normally low except in the diamond mining areas.

Minor roads form the humblest category and only the most rugged vehicles can use them throughout the year. They are simply cleared tracks with running surfaces mainly or entirely of the natural soil; often such roads are formed by vehicles themselves beating out a track, with, as time passes, small improvements in drainage and surfacing at particularly difficult places. Streams are crossed by fords or by bush-pole bridges whose crude construction involves the spanning of the stream by a few logs interlaced with smaller sticks, and given a top cover of soil. In Sierra Leone, with a marked dry and wet season, there are usually two roads: a wet season road following the watershed and a dry season road running lower in the valleys.

Since construction of such roads is generally not designed, typical costs cannot be given.

Despite their poor quality, these roads are significant in that they represent a great proportion of the total road mileage, and further reflect what a community, desirous of improvement, can achieve on its own initiative. The roads are invariably feeder or pioneer roads linking a village to the nearest market. The length and even the location of this category of roads is very difficult to determine, since new ones are constantly being constructed and old ones sometimes abandoned. Field verification of the position and length of these roads, amounting to several hundred miles, is impracticable. Informants' recollections are often vague and administrative responsibility is diffused. However the omission will not seriously affect the discussion of the basic pattern of the national road network, since most are short spurs linking a single settlement to an established highway.

This classification, it is hoped, will have provided a comprehensive system that is reflective of the true state of the nation's road network. Emphasis has been laid on quality and function - the two criteria most significant in any consideration of roads. The prominence often attached to the various bodies in charge of roads has been ignored since this does not provide a constant basis as to road quality and function.

Road Pattern

The present-day alignment of roads as seen in Fig. 6.1, is often extremely tortuous. Early road builders, in order to reduce construction costs, avoided major river crossings where possible, this is one reason for the zig-zag nature of many roads following watersheds. Another reason is

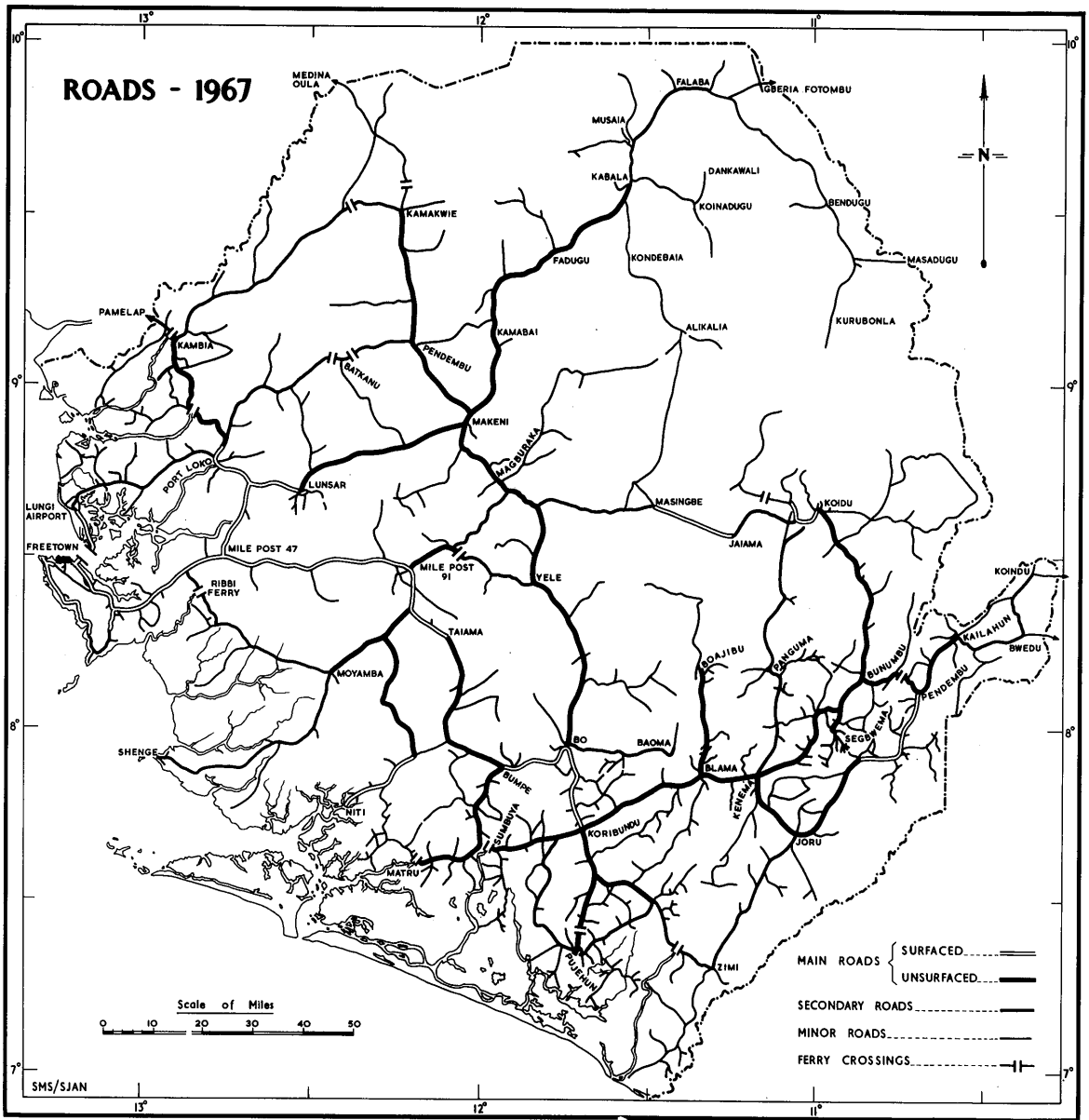

Fig. 6·1

Department of Geography, F. B. C.

to be found in the heterogeneity of road building agencies and their varied aims. Central government constructed roads to facilitate administration, government departments like Forestry and Agriculture, not forgetting private companies, all constructed roads for the economic exploitation of the country's resources, and more recently, politicians and local communities participated in active road construction to gain votes and reduce isolation respectively. Thus there was no coherent attempt at a plan for a national road network. At the same time the desire to preserve the monopoly of the railway resulted in an absence of roads which might compete with it. As the nation's demand for transport services grew, this position became increasingly unsatisfactory and major highways were created by linking portions of existing roads. This linking process was well developed in the south and east where roads, built to act as feeders to the railway, were numerous and the circuitous highway from Freetown via Taiama, Bo, Koribundu, Kenema and Pendembu to Kailahun, now Sierra Leone's major arterial route, is a result of this process.

In a general sense the basic pattern of routes is radial, centred on Freetown with main routes radiating to secondary urban centres such as Kambia, Kabala, and Kailahun. This simple radial pattern is however dislocated by the capital's coastal situation, which means that the first major junction is located 47 miles to the east of Freetown. Then there is the absence of any significant rod network in all the coastal areas. The few roads in this area are generally linked eastwards to an incomplete axis extending from Kambia in the north-west via Moyamba, Mattru and Pujehun to

Zimi in the south-east. Lastly a distinct transverse axis runs from Kamakwie to Koribundu, cutting across major routes radiating from Freetown. This north-south axis runs almost parallel to the eastern escarpment which it avoids almost completely.

The entire national road network contains only three major arterials: one links Freetown with the Northern Province; another with the South and Eastern Provinces, and the third links the north with the south. On these major arterials are hinged the rest of the country's roads. From Freetown a bitumen-surface road runs parallel to the axis of the peninsula as far as Waterloo, then continues north-eastwards to the important junction of Mile post 47. Here the road bifurcates and one artery runs due north to Gbere junction at mile 66; a major branch continues as a laterite road through Port Loko on to Kambia, crossing the two Scarcies rivers by motorized ferries, strikes the Guinean frontier and ultimately links up with Conakry. The main northern arterial continues due east to the mining town of Lunsar where the bitumen-surface terminates; then a gravel surface road continues north to Foredugu, veers north-east and, skirting the Wosum Hills in its last 5 miles, enters the northern regional capital of Makeni from the west. From Makeni, which provides a focal point for transport, several roads radiate to other northern urban centres, such as Kabala, whose circuitous road with hair-pin bends actually cuts across the difficult escarpment to enter the town from the south. From Kabala a secondary road links Sinkunia and Falaba with a branch going to the Guinean frontier and ultimately reaching Faranah in Guinea. The road continues in the Sierra Leone sector due south as a minor road, through Seria on to Kuruboula, and it is expected to link up with Kayima in the Kono District, thus

providing not only direct access between the two contiguous districts of Koinadugu and Kono, but the means of developing the plateau region of the north-east.

The southern arterial, which is today the country's main thoroughfare, continues due east from Mile Post 47 to Mile Post 91, where a laterite road branches off to Magburaka. From this road there is a bridge link across the Pampana river to Yele where it joins the north-south arterial. At Mile 91, the southern arterial turns sharply southwards to Taiama where the bitumen surface terminates. From Taiama it continues as a laterite road through Mano to Bumpe, and eastwards as a bitumen-surface road to Bo, which is the largest provincial town, has an important railhead and forms another major focal point for transport. The southern arterial continues on to Koribundu across the Sewa bridge and turns sharply east to Blama, Kenema and Bunumbu where it bifurcates, one branch running due north to Koidu/Sefadu in Kono, and the other continuing generally eastwards through Pendembu to Kailahun, thence to Buedu where it further splits up and continues as secondary roads to reach both the Guinean and Liberian frontiers, providing the only road access to Monrovia.

The third arterial runs in a general north-south direction from Kamakwie to Pujehun. It is entirely a laterite surface road and provides the major link between north and south. Most of the roads hinged on it are to the west, in the interior plain region; road links due east are few and

very recent, a feature easily explained by the inhibiting factor of the eastern escarpment. Traffic densities on this arterial are generally low despite the fact that it links major urban centres such as Makeni and Bo. Movement involves mainly passengers; freight traffic is poorly developed. This is not surprising since it was intended mainly to facilitate political administration.

On the whole the main roads exhibit a remarkable west-east alignment, emphasizing the fact that "all roads lead to Freetown". This pattern of alignment is most developed in the western half of the country, coinciding with the interior plain region. The north-eastern quadrant is remarkable by its lack of roads and here one finds a classic example of a transport gap. The south-eastern quadrant however, though part of the eastern plateau, is distinctive by its many roads - a feature mainly attributable to a high level of economic activity, reflected in cash crop production and diamond mining. Further, its dense population, in contrast to the north-east plateau area, has in no small measure fostered the development of roads.

The present radial pattern of roads, with a tendency to west-east alignment, represents a marked change from the original north-south feeder road system geared to serving the railway. This is to be expected for the roads have ceased to be functionally tributary to the railway, and today provide the main arterials for social and economic development. Hence their alignment is inevitably west-east, a pattern set by the railway and now being copied by the road system, which has virtually taken over

the railway's function of chanelling produce to Freetown and distributing imported goods to the rest of the country.

Road Construction

The construction, design and location of roads is as varied as the several bodies that undertake to construct and maintain them. Hence a main road may have a two lane carriageway with a two coat bitumen-surface, properly designed with cuttings, embankments and grass verges. The carriageway may be as wide as 24 feet. Again a main road can simply be a 15-foot laterite surface carriageway, with poor drainage and sharp bends. Such tremendous variations in the quality of roads falling within a single class is most unsatisfactory, and if roads and road transport are to play their maximum role in the development process, a change in procedures and policy are sorely needed. Experience gained by past direct government construction and that of foreign contractors like Vianini Brothers of Rome, coupled with any useful outside advice, should be collated and strict road building standards formulated and maintained. It is realized that the cost of road construction is high, for apart from abundant cheap labour and some road building materials and aggregates, the country produces at high cost, only a limited quantity of cement and does not manufacture asphalt. However, costly imported materials like cement, asphalt and steel, which feature prominently in modern road construction, should not deter efficient road construction. Wherever a highway is constructed or improved, no effort should be spared to make it a truly first class road. This will entail comprehensive planning to secure the best roads from a limited supply of costly imported materials, and there

should be an established scheme of priorities in road building so that each modern road will not simply reflect local needs, but will be conceived in the context of the national road network.

There is still a persistent lack of any comprehensive road plan. Several attempts have been made at planning; early contributors include the Roads Advisory Board, the Development Council and Sir H. Childs in his plan of Economic Development for Sierra Leone (1949). Despite the good intention of such early planners, their priorities were arrived at on mainly notional concepts. The demand for road transport was growing faster than the rate of road construction, and this had the dual effect of inhibiting economic growth and overloading the existing roads and bridges so that they were difficult to keep in a serviceable state. In any overall planning, it is desirable first to determine the importance of the road system in the total economic context, and to decide on a reasonable allocation of funds to such a programme. Secondly, it is necessary to assign priorities to the different road projects called for in the plan. This has not been the practice in Sierra Leone.

It is by now axiomatic that the basis of real economic development must be laid right on the ground, in the villages and among the people. This necessitates the linking up of each hamlet, each urban centre and each individual with the main stream of the nation's economic activity. Increased production in the principal sectors of the economy rests largely on improved internal communications. There is the urgent need to exploit new resources of production, but such can only be achieved by a formulated road programme

whose execution and continuity is not subject to easy disruption. Ad hoc decisions as to which road should be built, improved or repaired, fairly common at present, only tend to diffuse the limited resources of the country in a manner that is detrimental and inefficient. Furthermore, decisions concerning roads are often taken with hardly any regard for integration with other forms of development.

Finally, there is no doubt that tremendous effort has been put into the construction and improvement of roads in the last twenty years, but such effort, because it is diffused, has had all the ill effects of unplanned road development. The time has surely come for a re-evaluation of road policies and the formulation of a master road plan, based on present and future needs, to evolve a road network that has sufficient capacity to cope with increasing demand, and a quality that will not only hasten the flow of traffic, but minimize accidents and reduce the wear and tear on vehicles.

Road Maintenance

Maintenance is labour intensive, mechanical equipment is rare and highly diffused. On laterite roads, small groups of 6-8 men supervised by a Road Overseer who regulates and co-ordinates the work of six such groups, are responsible for the maintenance of 20-30 miles of road. Maintenance work tends to vary with the seasons: in the dry season, emphasis is laid on brooming the road to reduce the intensity of corrugations; in the rainy season, effort is directed mainly to clearing of drains, patching potholes, clearing heavy growth on the grass verges and filling swampy roads with rocks and stones. In the early dry season, the annual ballast of 3-6 inches

of selected fill is applied. Special compaction by rollers is not common, wheel traffic being depended upon to do this.

The present policy is to distribute the labour force mainly on a mileage basis which varies from 1.2-2.1 men per mile of maintenance work. Observations in the field clearly indicate that the basis for allocating labour should actually be traffic density, not only because roads with heavy traffic flows tend to show the severest deterioration, but also because productivity per man/hour in the the normal working day decreases proportionately with increasing traffic density.

In an attempt to observe in detail the effect of traffic volume on manual maintenance operation, a check point was established on the Kenema-Koidu road, precisely one mile south of the Penderbu road junction. At the peak traffic season, this road averages 400 vehicles per day of which 80% or 320 vehicles are concentrated in the period 7 a.m. - 7 p.m.; this gives an average of 26.6 vehicles per hour or 1 vehicle every 2.25 minutes. Most of the vehicles averaged 40 m.p.h. The labourers tended to stop work when the vehicle was 250 feet away, and resumed work immediately after the dust cloud generated by the passing of the vehicle has settled down. Thus each labourer had a total waiting time of 30 seconds in 2.25 mins. (4 secs. for the vehicle to pass and 26 secs. for the dust to settle down.) Total waiting time in an 8 hour working day amounted to 1 hour 47 minutes. In addition to this, normal productive time lost in travelling by foot to the more distant portions of the 5 mile sub-section may amount, under difficult weather conditions, to as much as 40 minutes. Hence the

normal working day in effect produced only a maximum of 5 hours 33 minutes of productive time. On the other hand, a check on the Kabala-Makeni road at mile 40 in the Kabala direction, a road with a maximum traffic density of 100 vehicles per day; over 90% of which are concentrated in the period 7 a.m. - 7 p.m. showed a time loss of only 30 minutes, through interuptions by vehicular traffic. Sometimes cattle moving on the hoof can cause a disruption of maintenance work lasting for as long as 15 minutes. The greater the number of cattle, the longer the period of work disruption. On the whole total time lost was only one hour in the normal 8 hour working day; leaving 7 hours of productive time.

These two examples point to two important conclusions: primarily that under the present system, roads with a high traffic density have fewer man hours devoted to maintenance while roads with less traffic, paradoxically, have more; secondly, that manual maintenance methods are unsuitable for roads with a traffic flow that exceeds 100 vehicles per day, but may be fairly adequate for those that fall below this critical density figure.

The obvious solution to the problem of road maintenance especially for main roads, is the adoption of mechanical methods. However, despite government's acquisition of 16 graders and their continued use, they have only been minor palliatives in the road maintenance problem. The reasons are many, but the more significant include the smallness of the grader fleet and its inability to meet the actual demand for maintenance. Financial limitations make it practically impossible to increase the fleet.

The design and construction of roads now subject to grading are unsuitable; the extreme dryness of the material cut and the lack of suitable compaction reduces the beneficial effects of graders to a mere 3 days. The potential benefit cannot be denied, but immediate research into soil characteristics and extensive road reconstruction, are priorities not be be neglected if mechanical maintenance is to replace the present slow and ineffective manual methods on main roads.

Maintenance costs on bitumen-surface roads are not usually expected to increase in direct proportion with traffic density, provided the road structure is adequate in strength and thickness for the traffic. Resurfacing may not be required for 5-10 years. In Sierra Leone, the policy has been to seek funds for applying a bitumenous surface on roads whose average traffic count rises over 100 vehicles per day. Usually a two coat surface dressing is applied and resealed every 4-5 years. Bituminous premix carpets are not usually considered for, as explained by officials of the Ministry of Works, it is at present impossible to maintain control in the selection and placing of the base on most roads, hence it is undesirable to undergo great expense in putting down a bituminous carpet on a base with uncertain qualities. Failures in such cases are costly to repair, whereas a two coat surface can be dealt with comparatively easily and cheaply.[4] Maintenance here involves only two major problems, the provision of an adequate supply of suitable aggregate within economical haulage distance and the mechanization of the process of laying the carpet.

The intensity of the problems varies with the type of road. It is severest on the important Freetown-Waterloo road whose hasty construction in the Second World War period makes it a classic example of a bad surfaced road, and it is here that maintenance work is frequent and most expensive. On the other bitumen roads, maintenance costs are usually lower, for these comparatively recent roads were constructed using modern techniques, and their quality does not necessitate frequent resealing. Provision of aggregates was previously centralized on a single quarry, but the haulage distance tended to increase the cost of aggregates to levels considered uneconomic. Hence a new policy of decentralization was adopted; small mobile units capable of generating sufficient aggregates to meet one season's operations were dispersed all along the surfaced roads. Although climatic conditions of high humidity impose a serious setback on the efficiency of mechanized laying of the reseal carpet, yet the process has certainly proved beneficial to the speedy maintenance of the surfaced roads. Further the country is well endowed with granites and syenites which are first class road aggregates. The only problem is the absence of a suitable local substitute for bitumen which has to be imported at great cost.

Road maintenance is a real problem and if the present trend of road transport continues, the point will soon be reached where practically all internal movements of goods and passengers become a function of highway transport. It therefore becomes imperative that the greatest emphasis be placed on adequate maintenance of roads so that commercial and other

vehicles can be operated on all weather roads at reasonable costs, and that the economic life of the vehicles may be extended and the present high cost of road transport thus reduced. Economic progress cannot afford to stand still and wait out the time necessary for new construction or reconstruction of the present road system; major improvements in the system can be attained by a carefully designed programme of road maintenance. At the same time it should be realized that the lasting remedy to the defects of the road system lies in the speedy surfacing of the major arterials so that the recurrent problems of scour, corrugations, and pot holes, noticeable even with mechanical maintenance methods, can be eliminated for good.

Present Sources of Revenue

Up to the present time, funds for road construction and maintenance have come largely from allocations in the ordinary budget and in the development budget. Maintenance and administration are usually carried in the ordinary budget while major road construction are included in the development budget. Revenues for the ordinary budget originate from the usual sources of taxes, custom duties etc., while revenue for the development budget is derived in varying amounts from several of the following sources:

(a) transfers from the ordinary budget

(b) United Kingdom free grants

(c) Commonwealth assistance loans

(d) (more recently) internal loans.

Most external loans are negotiated for general development purposes including road construction. It is not usual for specific loans to be designated to road development, the only known exception being the present 4 million leone road project linking Masingbe with Jaiama Sewafe in the Kono District. Part of this, (2 million leones) is a loan from West Germany specifically intended for this road project, and in fact the road builders are a German firm. On the whole there has been appreciable fluctuation in the funds available annually for road work, and a chronic insufficient advance knowledge to allow for systematic planning of road development. From the available records, development funds allocated for highway construction have ranged from a low of about Le 400,000 in 1952 to a high of Le 2 million in 1964, with an annual average of about Le 800,000 in the period 1952-1966.

Past and present accounting procedures in the Ministry of Works are not designed to maintain separate records of expenditures for individual items in the general functions. Hence figures relating to individual items are mere estimates. The only exception is to be found in allocations from the development budget, since these are very close to actual expenditures on new road construction, although a small percentage is inevitably expended on administration. On this basis, the current annual expenditure on new road construction is estimated at Le 750,000. A further breakdown reveals that annual maintenance costs average about Le 1,250,000 including administration. On the whole, exhaustive checks on records and official opinion indicate that central government spends about Le 2 million per

annum on road construction, maintenance and administration. This figure includes the annual contribution of Le 90,000-160,000 to district council roads and sometimes to chiefdom roads, in the provision of bridges over major streams.

The current highway expenditure represents about 5.6% of total central government ordinary and development expenditures. As noted above, the uncertainties involved in the determination of budget allocations, especially in the face of other crying needs, makes planning and scheduling of an orderly and continuous road programme impractical. Though this deficiency is appreciated by planners, they have not been able to convince central government of the need to revise its policy on financing road projects. Both, Dr. Carney in his comprehensive Ten Year Plan[5] and Professor D.T. Jack in his Economic Survey of Sierra Leone,[6] have categorically pointed out the need for a change in road finance policy and have even gone to the extent of suggesting the creation of a Highway Authority[7] - a theme reiterated in T.C.I's Transportation Survey of Sierra Leone.[8] The Highway Authority, if created, would be on a self-financing basis for the construction, maintenance and operation of the national road network. Hence all revenue-earning activities connected with road transport would be geared to financing the Highway Authority. Some major revenue sources would include import duties on vehicles and motor fuels; and also revenue from licences. Perhaps a novel source of revenue would be the imposition of road tolls on selected highways. This would no doubt meet with initial difficulties in a community too accustomed to the idea of "free" roads; but

if the road system should improve, then the road users ought to carry their fair share of the huge costs involved. This theme will be given elaborate treatment in another section. Finally the Highway Authority when created on the suggested self-financing and self-accounting basis, should eliminate the problems and frustrations of the annual budgetary period which have become a perennial feature under the present system. It must however be pointed out that for any intensive and comprehensive road programme, the Highway Authority will have only a limited capacity to generate revenue internally; hence it must be given sufficient government backing to raise foreign loans to meet the heavy initial costs of the programme.

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CHAPTER 7

FACTORS INFLUENCING ROAD DENSITY

In Sierra Leone, as in most developing counties, the present stage in the expansion of the transport system involves a steady growth in the number of motor vehicles and a concomitant increase of road mileage, producing greater accessibility among the various nodal points such as urban centres. This phase is also characterized by the dominance of road over rail transport. Thus a common theme in the evolution of the transport system in Sierra Leone, as in other West African countries, has been the phenomenal rise in the importance of road traffic which first complements the railway, then competes with it and finally overwhelms it. Today the trend is intensified by the fact that a great number of road penetration lines are now being built in areas which would have required rail penetration lines in the past. Thus one notices a new transport philosophy with emphasis shifting from the railway, which was once considered an indispensable transport medium in the mercantile-oriented economy, to roads and road transport, reflecting the urgent need to diversify and enhance the internal exchange economy.

The present spatial diffusion of the road system is the cumulative product of several inter-acting factors. To isolate a specific factor in the general road development theme as a total causal explanation, will produce conclusions whose general applicability is limited. Nevertheless, it is essential to select a dominant factor and treat it in relationship to other factors in road development. Having critically examined all the possible factors and having subjected each to mathematical analysis, it was

found that the population factor accounted for a greater part of the variation. Accordingly, the factor has been considered the dominant one. Other major phenomena such as urban effect, physical environment, economic activity or degree of commercialization and inter-modal competition, are then treated as factors either directly influencing the road density pattern or modifying the road-population density relationship. Hence in this study, the demographic theme is given extra emphasis; but as already stated, not to the exclusion of other factors whose role not only modifies the population effect, but sometimes goes further towards explaining the road density for particular areas.

Road Density

In arriving at the road density as shown in Fig. 7.1 the following approach was employed. The whole national territory of Sierra Leone was divided into a series of grid cells of about 700 square miles in area. The total road mileage for each cell was then calculated and entered on the appropriate cell. Cells with similar values were grouped together. With these as reporting units, 8 road density categories ranging from less than 21 miles to over 141 miles per grid cell were mapped out as shown in Fig. 7.1. The mean road density was then calculated at 80 miles per grid cell and variations from this observed mean were entered either as positive or negative values. This method not only gives the absolute road density but also the much more significant deviations from the national average. The observations, apart from the low national road mileage of 0.12 miles per square mile of territory, further high-light the need for greater

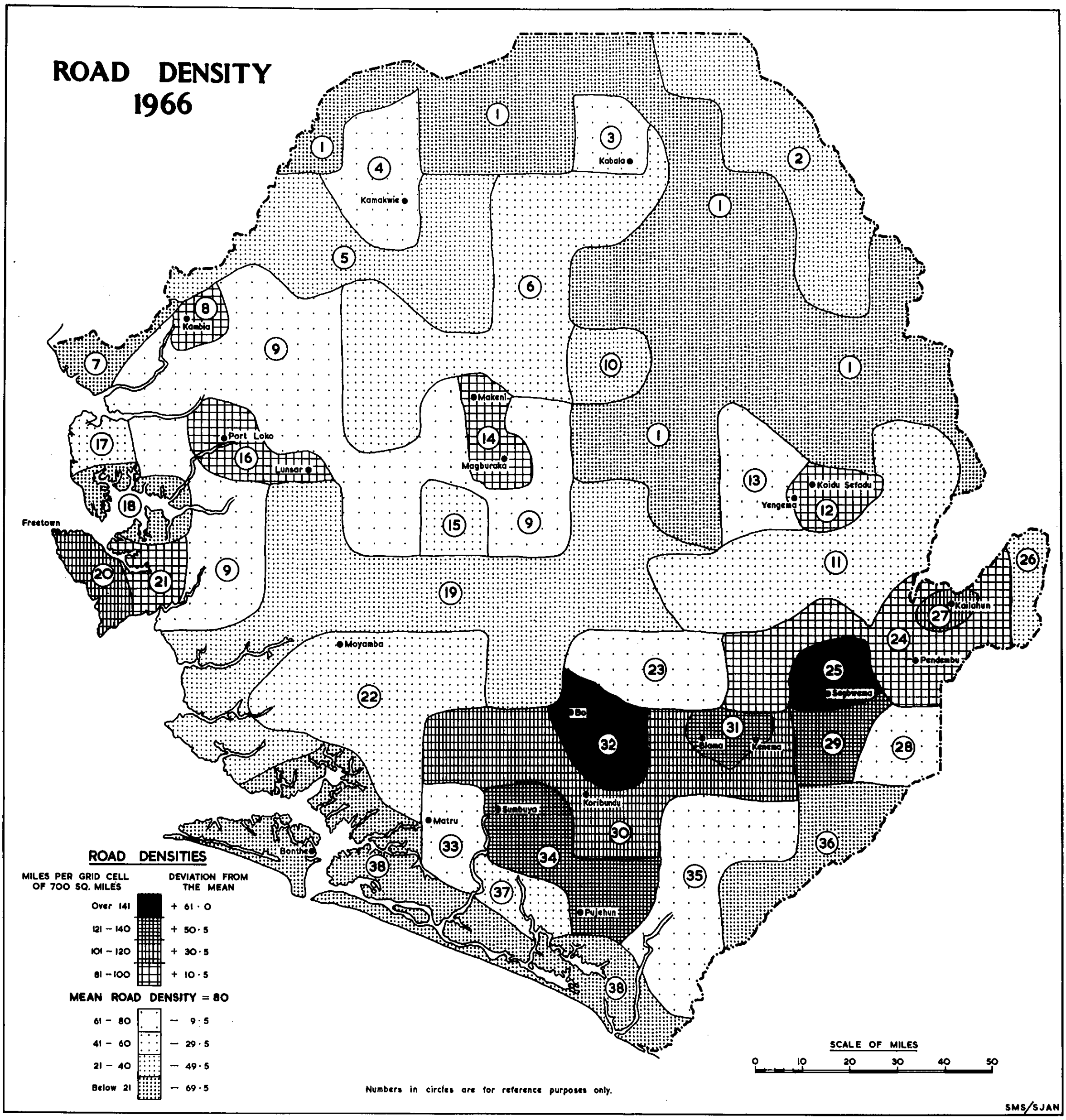
ROAD DENSITY
1966
Kabala
Kamakwie
Kambia
Makeni
Port Loko
Lunsar
Magburaka
Koidu Sefadu
Yengema
Freetown
Kailahun
Pendembu
Moyamba
Bo
Segbwema
Blama
Kenema
Koribundu
Sumbuya
Matru
Bonthe
Pujehun
ROAD DENSITIES
MILES PER GRID CELL OF 700 SQ. MILES
DEVIATION FROM THE MEAN
Over 141 + 61·0
121 – 140 + 50·5
101 – 120 + 30·5
81 – 100 + 10·5
MEAN ROAD DENSITY = 80
61 – 80 – 9·5
41 – 60 – 29·5
21 – 40 – 49·5
Below 21 – 69·5
Numbers in circles are for reference purposes only.
SCALE OF MILES
0 10 20 30 40 50
SMS/SJAN

Fig. 7.1.

road construction since 60.4% of the areal units or 75% of the national territory, have road mileages below the average. The road density map, (Fig. 7.1) on careful examination, gives the visual impression of definite road density zones - a zonal pattern that is portrayed in Fig. 7.2.

Zonal Pattern

Zone I. This represents an area of high road density centred in the south and south-east of the country. It extends from Mattru in the west, through Bo, Segbwema, Kailahun to Buedu near the eastern frontier; then stretches in a south-easterly direction from Mattru and a south-westerly direction from Buedu, terminating ultimately at the Mano river in the south-west frontier. Within its confines, the zone includes many large urban centres such as Kenema, Blama, Pendembu and Pujehun. The area exhibits a high degree of commercialization for it forms not only the focal zone for cash crop production, but is also active indiamond mining. The core area of the zone has the greatest concentration of economic activities, while the peripheral areas are only marginal; this is reflected in the road density pattern which averages 0.17 mile per square mile of territory in the Buedu and Zimi areas near the Liberian frontier. Further the core area is a zone of high positive deviation while the peripheral area is one of low negative deviation.

Zone II. This zone of high road mileage is centred largely in the south-west quadrant of the northern half of the country. It is best subdivided into two areas:

(a) The first area constitutes the western peninsula in which is situated the capital city of Freetown. The area is characterized by rapid

rate of urbanization, population growth due mainly to immigration, industrialization and provides a major focal point for employment. The road density averages 0.14 mile per square mile of territory with a population density of 200 persons per square mile.

(b) The second area properly belongs to the provinces. Its southern loop forms the boundary with the peninsula zone encompassing virtually the whole of Port Loko District, the southern portion of Kambia District and the immediate peripheral areas of Makeni and Magburaka. Economically, the zone is important in swamp rice cultivation mainly in the Scarcies region and iron-ore mining in the Marampa area. Unlike Zone II (a), it has a low degree of commercialization which is reflected in a high density of rural population. Average road density is 0.11 mile per square mile of territory which gives it, with the exception of the urban areas of Kambia, Port Loko, Lunsar and Magburaka, a general negative deviation from the national road average.

It is interesting to compare this northern zone with Zone I in the south. Both have the same population density of 150 per sq. mile but their respective road mileages show a remarkable difference. Zone II (b) with 0.11 mile per square mile of territory compares unfavourably with the 0.17 of Zone I. This feature introduces the factor of economic development; for Zone I, with its high degree of commercialization, logically possesses a denser road network than Zone II (b) where economic development is at a low level.

Zone III. This constitutes three small areas of comparatively high road mileages.

(a) Central Kono District centred in the rapidly expanding diamond mining towns of Koidu-Sefadu and Yengema. The area was for long a zone of road deficit; for organized diamond mining as practised by the Sierra Leone Selection Trust Ltd. (S.L.S.T.) was not dependent on an elaborate and efficient road network; short spurs of crude access roads were adequate to link the producing areas with the company's plants which were conveniently located near the main Koidu-Yengema road. However African participation in diamond digging precipitated a phenomenal yet unorganized road building effort to link up mining villages with either established road arterials or urban centres, so as to facilitate the movement of mining equipment and food to the digging sites. Since the pattern of African mining is in the form of a "diamond rush", roads tend to appear and disappear with the rise and fall of mining areas. Thus the real road density of the area is not precisely known; but is estimated to be about 0.11 mile per square mile of territory.

(b) A northern zone centred on the town of Kabala and limited to the town's immediate peripheral area. The comparatively high road mileage is a reflection of the recent need for increased accessibility between the rural areas and the market town of Kabala. The present high degree of road interconnection has been achieved mainly by local authorities among which chiefdom councils feature prominently.

(c) A north-western zone centred on Kamakwie, an area that is increasingly becoming important for cattle rearing. It is also an area of

appreciable migration of both population and cattle from the neighbouring Republic of Guinea, producing an intensified economic activity based on rice cultivation, palm kernel production and cattle rearing. Hence the need to create an efficient road interconnection between the rural producing areas and the town of Kamakwie.

Zone IV. This extends from the north-west, runs parallel to the northern frontier and veers due south to embrace virtually the whole of Koinadugu and the northern half of Kono District. It is generally coterminous with the northern half of the plateau and hill region. The area is to a large extent economically negative especially in the northern Bombali and Koinadugu District sectors, which are associated with a predominance of subsistence agriculture and cattle rearing. The Kono District sector is economically more bouyant because of large-scale diamond mining. The zone is characterized by a poor savanna vegetation, infertile soils and a mean annual rainfall of about 90 inches which is concentrated in the short period June to August. Hence the hilly terrain, coupled with adverse climatic and soil conditions, have together produced an ecological environment which is neither conducive to the congregation of dense populations, nor to development of cash crop agriculture. Further it has introduced an element of demographic instability since the area is one of the major source regions of population emigration. The interaction of the above factors has produced a zone of low road mileages whose average is 0.046 mile per square mile of territory, thus registering a negative deviation of 69.5 from the national mean.

Zone V. A south-western zone with a peripheral location embracing the coastal portions of Moyamba, Bonthe and Pujehun Districts including Sherbro Island. Physical environment in the form of all categories of swamp, is the major factor in determining the observed areal diffusion of the road network. The area is characterized by a general low density of population and a low level of commercialization. It has a road density of 0.046 mile per square mile of territory which gives it a negative deviation of 69.5 from the national average.

Zone VI. A minor south-east zone in the Gola Hills region that is heavily forested and difficult of access. Roads penetrating this tropical forest zone are largely the creation of the Forestry Department to facilitate the exploitation of timber. It has a road density far below 0.046 mile per square mile of territory.

Zone VII. On the north-west coast are two zones with low road mileages and dense population patterns.

(a) The northern zone lies mainly in the north-western frontier area with the town of Kychom at the mouth of the Great Scarcies as its centre. It is an area of intense swamp rice cultivation and a dense rural population often as high as 150 per square mile, but with a road density of only 0.046 mile per square mile of territory.

(b) The southern zone is peripheral to the peninsula area but restricted largely to the riverine areas of the Sierra Leone estuary. The area has a very dense population pattern-over 200 per square mile-especially in the Bullom region where intensive agriculture, based mainly

on market gardening, is practised. The area's produce is marketed in Freetown and the picturesque Bullom boats are important in the carrying of this trade. It has a road density of 0.046 mile per square mile of territory which is far below the national average.

Zone VIII. The zone is located in the middle of the country, extending from the western coast at Shenge right on to the eastern frontier in Kono District. It is broader in the western half- in the Moyamba District area - and gradually tapers eastwards. Commercialization is not well developed and the production of ginger in the Moyamba area and fishing at Shenge are the major economic activities. Historically the zone is important, for it coincides with the southern limit of Temne penetration and the northern limit of Mende expansion; hence it was in the past an area of instability and tribal warfare. Today this historical experience is reflected by the tribal admixture of Moyamba, Rotifunk and Mano where Mendes and Temnes coexist. The area averages 0.057 mile per square mile of territory - a figure which is about half the national average.

Zone IX. This is mainly savanna territory with fairly infertile soils. An interesting feature of the area are the Bolilands - inland swamp grasslands which become flooded in the rainy season.[1] These seasonal swamps have a great agricultural potential especially for rice cultivation but their basic problem at the moment is the lack of irrigation. When this water problem is solved, the area's low road density may be radically changed with the development of intensive rice cultivation.

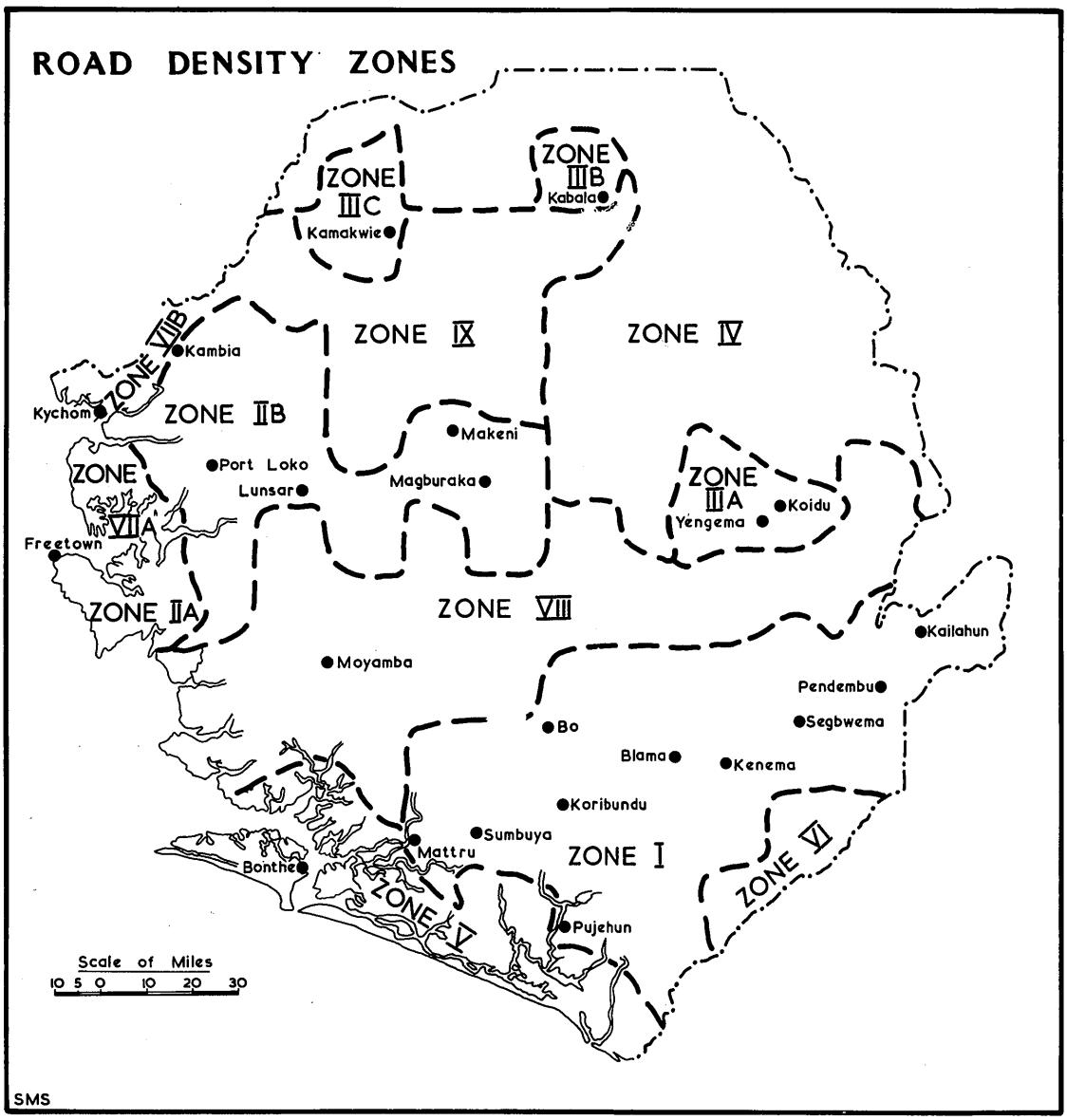
ROAD DENSITY ZONES
ZONE IIIC
Kamakwie
ZONE IIIB
Kabala
ZONE IX
ZONE IV
ZONE VIIB
Kambia
Kychom
ZONE IIB
Makeni
Port Loko
Lunsar
Magburaka
ZONE VIIA
Freetown
ZONE IIIA
Koidu
Yengema
ZONE IIA
ZONE VIII
Kailahun
Moyamba
Pendembu
Segbwema
Bo
Blama
Kenema
Koribundu
Sumbuya
Mattru
Bonthe
ZONE I
ZONE V
ZONE VI
Pujehun
Scale of Miles
10 5 0 10 20 30
SMS

Fig. 7.2.

This discussion on the zonal pattern of road densities is based largely on the observed values of the various grid cells. There has been no serious attempt to give a functional explanation of the zonal pattern; various important factors have been touched upon, but none discussed in any detail. As such the following section will attempt to isolate certain specific factors and relate them individually to the process of road development. However it must be emphasized that although each factor will be treated separately, the overall pattern is essentially the product of several factors; the isolation of any one factor is simply to demonstrate its dominance in any particular instance.

Urban Effect.

Without exception, areas immediately surrounding major urban centres tend to have high road densities, the reason being that there is a greater need for accessibility between these areas and their urban centres. Hence of the 14 such areas enumerated in the road density map, 11 show positive road density deviations and only 3 have negative deviation. This is to be expected since urban centres provided the earliest transport modes from which has developed, over time, an intense road inter-connection linking producing areas with the urban market centres. This is mainly a functional relationship and one can even generalize that the greater the functional importance of the urban centre, the more the tendency for its immediate surrounding area to show a high road network density. Hence in the Sierra Leone context, urban centres that serve export agricultural areas where the need for an efficient road network is of paramount significance,

have an extremely high road density as is exemplified in the case of areal unit numbers 25,31, 32, and 34, whose urban centres are Segbwema, Kenema and Blama, Bo, and Pujehun respectively. These 4 areas have road densities ranging from 0.19 to over 0.20 mile per square mile of territory, giving an absolute positive deviation of over 50.5 above the national average. In areas where cash crop production is not a dominant economic activity, the trend towards high road density is minimized and this is typified in areal units 12 and 14, with Koidu-Yengema and Magburaka being the urban centres. The former represents a mining area and the latter subsistence agriculture. Both have road densities of 0.13 mile per square mile of territory, but this gives a small positive deviation of only 10.5 above the national average. Areal unit 20, with the capital city of Freetown as urban centre, is interesting in that one would have expected it to posess the highest road mileage density because of the intense urbanization in the Freetown area; but this is not the case. A combination of factors, prominent among which are the absence of export agriculture and difficult environment, have produced the comparatively low road mileage density of 0.16 mile per square mile of territory giving a positive deviation of only 30.5. Despite this apparent abnormality, the generalization that areas immediately surrounding urban centres tend to show high road mileage densities, has universal application in the Sierra Leone context.

Physical Environment

The physical environment is considered here mainly in terms of being "hostile" to road development. This negative aspect of the environment is significant in isolating areas of road deficit and road gaps. At the

scale of anlysis, two environmental conditions seem to produce the tendency for low road mileages in certain area. These are very steep and consistent slopes such as the eastern escarpment area (Fig. 7.3), the trend of which is generally at right angles to the country's alignment of major traffic flow; and secondly, extremely swampy land or sandy coastal areas. In Sierra Leone, low road density is observed in the coastal swamp areas of Port Loko and Kambia Districts in Zone VIII; and of Moyamba, Bonthe and Pujehun Districts in Zone V. It is interesting to compare the northern swamp area with that of the south: for this provides a classic example of the deterrent effect of "hostile terrain" in road development. Both areas are swampy and also experience marginal water transport competition especially in the movement of freight. On the other hand, the northern zone exhibits greater economic activity based on mechanical swamp rice cultivation which was started in 1927; this has probably led to the congregation of an extremely dense population in the area averaging about 200 per square mile. The southern swamp zone, in contrast, has a low level of economic development and a population density of only 50 per square mile. One would have expected the difference in degree of commercialization to be reflected in the road density pattern, but this is not the case; for both areas have a very similar road density pattern. Hence the factors of economic activity and population density have been made subservient to the dominant environmental control of a hostile swamp terrain that effectively impedes the development of roads.

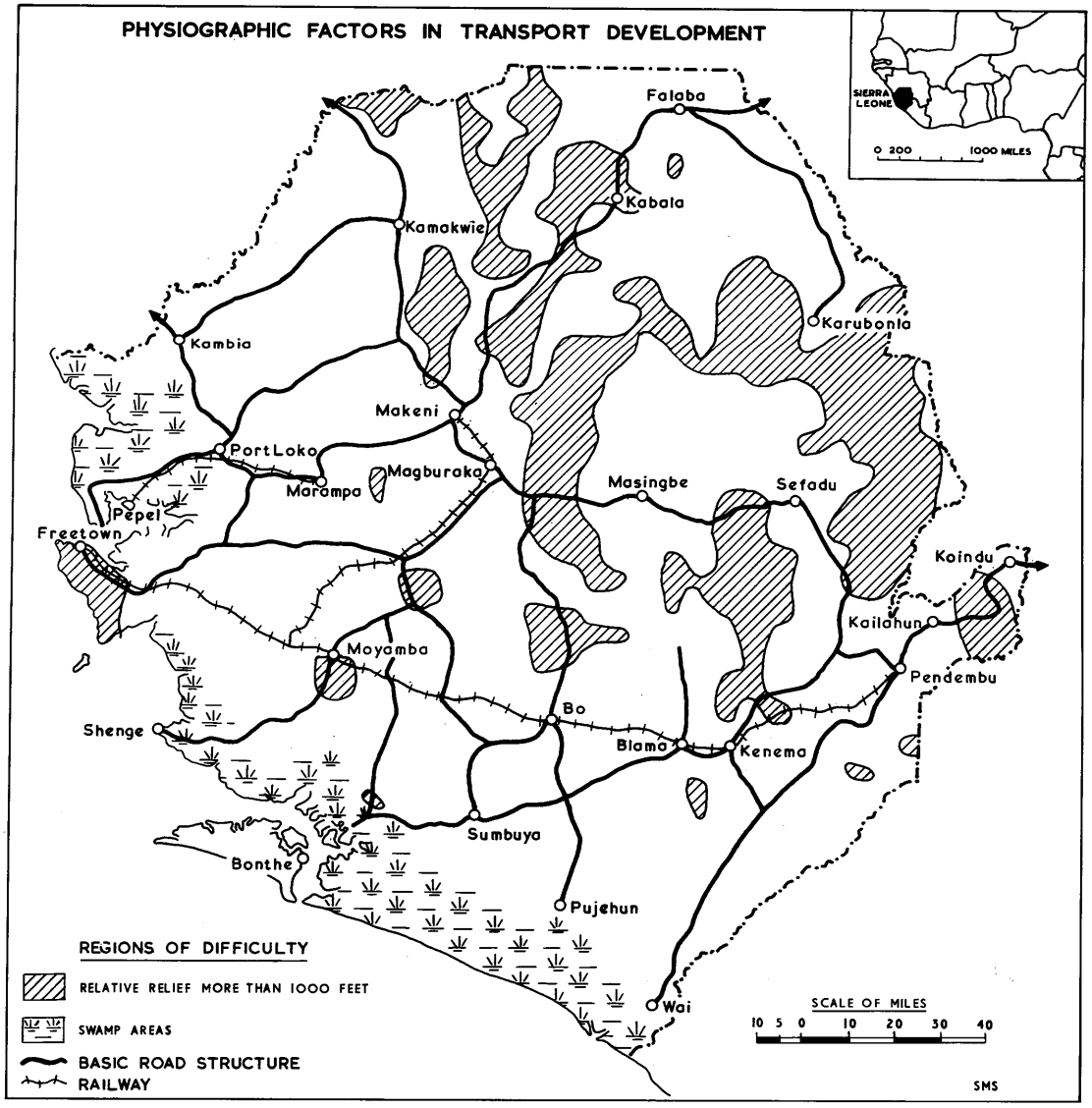
PHYSIOGRAPHIC FACTORS IN TRANSPORT DEVELOPMENT
SIERRA LEONE
0 200 1000 MILES
Falaba
Kabala
Kamakwie
Karubonla
Kambia
Makeni
Port Loko
Magburaka
Masingbe
Sefadu
Marampa
Pepel
Freetown
Koindu
Kailahun
Moyamba
Pendembu
Bo
Shenge
Blama
Kenema
Sumbuya
Bonthe
Pujehun
Wai
REGIONS OF DIFFICULTY
RELATIVE RELIEF MORE THAN 1000 FEET
SWAMP AREAS
BASIC ROAD STRUCTURE
RAILWAY
SCALE OF MILES
10 5 0 10 20 30 40
SMS

Fig. 7.3.

The north-east quadrant of the country exhibits strong evidence of the deterrent effect of a broken and mountainous terrain in the evolution of a road network. The area is typified by the difficult eastern escarpment and the interior plateau dissected by deep and steep sided river valleys and prominent mountain masses, such as the Loma in the centre and the Tingi-Niger in the extreme east. Again a comparison of the northern and southern portions of this interior plateau and hill region reveals an interesting variation in the relationship between "hostile" environment and road density. The observed modification is mainly a factor of economic development. The northern portion, centred largely in Koinadugu district, is characterized by a sparse population pattern and an extremely low level of development consisting of shifting upland rice farming and cattle rearing. In the southern portion is evidenced a high level of economic development, as seen in diamond mining, cash crop production and a general dense population pattern. This difference in level of economic development has produced a low road network density in the northern portion and a comparatively high one in the southern portion, emphasizing the dominant control of the physical environment in the north and its minimal effect in the south, where economic activity is a more significant factor in road development. This last observation introduces the fact that the effect of a hostile environment is largely temporal; if the need for roads can be economically and socially justified, adequate finances and modern technology can push through road penetration lines in almost any area of

Sierra Leone. This interesting feature whereby the economic and demographic patterns nullify the disadvantages of a hostile environment, must logically lead to a discussion of the economic factor in the evolution of the road system.

Economic Factor

It can be assumed that productive areas tend to have a comparatively high income and consequently a high road mileage. Also areas geared to cash crop production tend to have a higher road network density than those focussed on mineral exploitation. The road density map gives a visual impression of this pattern; for example, the high road mileage of Zone I averaging 0.17 mile per square mile of territory, is definitely associated with an export agriculture based on cocoa, coffee, palm kernels and piassava. The commercialization of these products requires an efficient road system - a feature long recognized and developed both by the railway management in the early creation of feeder roads, and by the central government in improving the road system of the area. Hence the spread of cash crop production has been followed by the development of dense road network patterns to facilitate the evacuation of the crops from the farms to the buying centres.

On the other hand, mining areas, despite their high level of production and income, tend to have a comparatively lower road mileage density. In the Kono District, where diamond mining is the dominant economic activity, road density values indicate a trend towards negative deviations from the national average. The mining of diamonds does not generate a need for

the construction of many roads. Even the recent influx of African mining concerns has not really generated any substantial development of permanent roads; crude access and pioneer roads do appear very frequently on the landscape, but they also tend to disappear too quickly. Thus the district, despite its high level of commercialisation, has a general low road network density.

In the Marampa area, a similar pattern is visible in the iron-ore mining district where bulk transport of the mineral ore, is a function of the private mineral railway extending from the mine site at Marampa to the exporting port of Pepel. It is possible to explain the low road density in this area in terms of railway competition, but a look at the situation in the Mokanji and Mobimbi mining areas, will confirm the original observation of the tendency for mining areas to be associated with a low road density. At Mokanji, the Sierra Leone ore and Metal Company Ltd. (SIEROMCO), exploits rich bauxite deposits of 62% alumina content[2] and further south at Mobimbi, Sherbro Minerals Ltd., exploits rich rutile deposits of about 4% mineral content.[3] Both mining concerns depend on road transport for the bulk haulage of the mineral ores to the exporting port of Niti. The presence of these large-scale mining concerns has not appreciably affected the road density situation; and the pattern remains low. What is directly attributable to the mining concerns is a major road improvement which has given a bitumen-surface to the access road from Mokanji to Niti; and the construction of a few short spurs of road to the mining sites. It is not likely that the mines will generate

any substantial road construction to change appreciably the density pattern, since feeder roads and interconnections bear little direct economic relevance to the immediate interests of the mining concerns. Hence mining areas,,as already observed, will for a long time continue to show low road network densities despite their high level of economic production.

Inter-modal Competition

Inter-modal competition could operate on two fronts: it could be negative by reducing the need for roads and providing alternative transport facilities; it could be positive by encouraging the development of roads - especially feeder roads. Water transport tends to produce the former situation while railway competition seems to operate more on the side of the positive effect, though there is evidence for the validity of both situations. Hence areas of coastal location with established water transport facilities, as seen in the case of the Scarcies region, have low road mileage densities since the bulk movement of produce is largely a function of water carriers. A similar situation obtains in the Sherbro region (areal unit 38) where land transport is important as far as Mattru and Pujehun, but in the complex tidal creek areas where mangrove swamps, lagoons and beach ridges dominate, water transport provides the only effective means of communication. It is therefore not surprising that Sherbro Island, an early contact point with European trade, still has no overland vehicular transport, and perhaps the urgent need to create efficient external links in the area may explain the recent controversial

location of two airfields - one at Gbangbatoke close to the bauxite and rutile mines, and the other at Bonthe, once an important port, but today moribund and silting up.

As stated earlier, evidence points to the fact that railways tended to generate the proliferation of feeder roads from nodes on rail penetration lines. These roads were first conceived of as complementary transport media subservient to the railway. With time the cumulative process in transport development has augmented the growth and improvement of these early feeder roads so that today, railway-serviced areas tend to have high road mileage densities. This is much more so in the south and east, along the rail track running from Bo through Kenema to the rail terminus of Pendenbu, where the association of the railway with a high road network density is a concrete transport manifestation of a high level of income, urbanization and commercialization. There are of course minor instances where the railway is associated with a poor development of roads, but this seems to be where a deliberate government policy of protecting the railway has been pursued. This may be the case in the Moyamba area where the lack of early feeder roads and the consequent poor road network, are a reflection of low economic potential and the desire to secure a railway monopoly on the limited available traffic. Apart from this marginal case, the presence of the railway, unlike water transport, has had the overall positive effect of encouraging road development.

Relationship between Road and Population Density

A visual comparison of the road and population density maps (Figs. 7.1 and 7.4) would seem to indicate a high degree of correlation between the

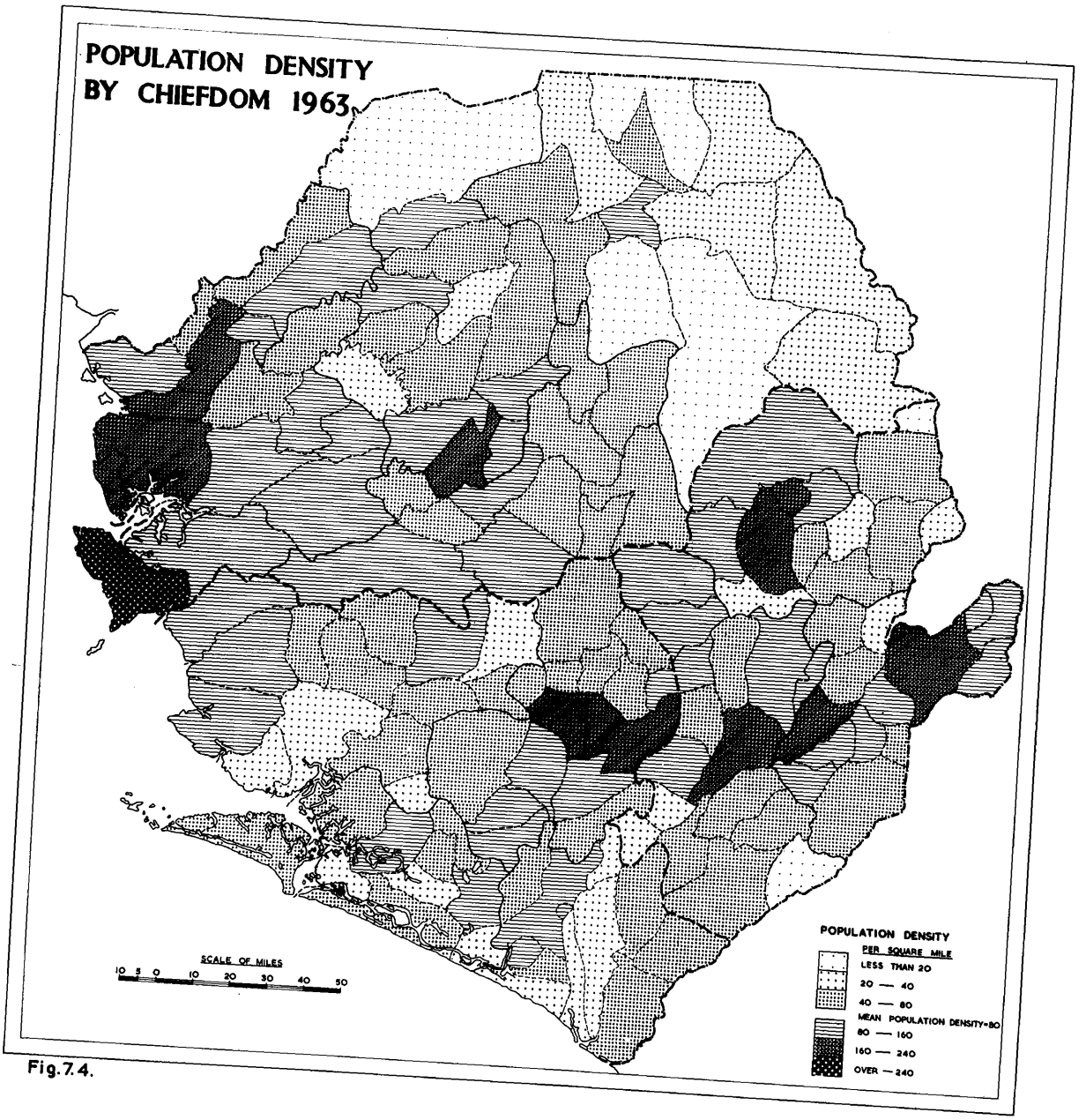
POPULATION DENSITY
BY CHIEFDOM 1963.
SCALE OF MILES
10 5 0 10 20 30 40 50
POPULATION DENSITY
PER SQUARE MILE
LESS THAN 20
20 — 40
40 — 80
MEAN POPULATION DENSITY=80
80 — 160
160 — 240
OVER — 240

Fig.7.4.

two. Broadly speaking, both have dense areas in a broad belt with a south-west/north-east alignment extending from Pujehun in the south through Bo, Blama, Konema, Pendembu to Kailahun in the east; in central Kono District, restricted to the areas immediately surrounding the urban centres of Yengeme and Koidu; in the Western Area, where the capital city of Freetown is located, and lastly around the areas surrounding urban centres such as Kambia, Port Loko, Lunsar, Makeni and Magburaka. Low densities are associated with the north-east and south-west regions; the Gola Forest region in the south-east and in the broad middle belt which bears the areal unit number of 19.

To compare the two distributions more accurately and to measure the degree of relationship more precisely, Spearman's Rank Correlation Coefficient method was used.[4] In the calculations, population data in the 1963 census could not be assigned to each of the grid cells used in working out the road density values; instead the irregular and unsatisfactory chiefdom units were used, thus giving what is essentially an estimate. Both the road and population density figures were elevated towards the higher values since it is generally accepted that the enumerated population is most likely to be lower than the true population figure, and the road mileage mapped unavoidably omits some minor roads. The result obtained from the calculation gave a coefficient of correlation, $r = \pm 0.55$. This coefficient of correlation is not as high as one would have liked it to be, however its low value is easily explained by the modifying influences of the earlier factors already explained. Nevertheless the

population factor still gives the greatest explanation for the observed road variation pattern. It is considered that although the correlation coefficient gives a positive value, it is not high enough to warrant the use of regression line analysis in pointing out deviations from the expected road-population density equation. Such further work will only tend to produce results which are very inconclusive, because the road-population equation is heavily influenced by other factors such as level of economic development.

A closer comparison of the road and population density maps will give the interesting feature of a greater correlation in the south than in the north. Generally areas of a positive road deviation tend to coincide with areas of a positive population deviation - this is true for the Western Area as it is for the south; but in the north, a different picture emerges where positive road deviations mainly coincide with the areas of positive population deviation centred around urban areas. The bulk of the rural areas where positive population deviations are observed, especially in the rice producing Scarcies region, have a road density that is invariably negative in deviation, suggesting that these represent road deficit areas where there is less road mileage than one would expect for their population density. In northern Kono District there is the case of a dense mining and agricultural population, especially in Sando chiefdom, having the very small road mileage density of less than 0.45 mile per square mile of territory. Again in the south, there is the observation that certain areas, for example rural unit 55, despite their low population density, tend to have comparatively high road densities than

one would expect for that population level.

There is generally, a remarkable correlation between areas of sparse population and areas of low road mileage density. Such areas are epitomized in the north-east, mainly in Koinadugu District where road densities averaging 0.046 mile per square mile of territory may likely indicate a functional relationship with the population density of about 30 per square mile. A similar situation obtains in the south-west coastal areas; in the north-west plateau region, in the south-east Gola Forest region and along the edge of the eastern escarpment. Finally, although the impression obtained by comparing the road-population density maps and the correlation coefficient of + 0.55, suggests a positive correlation between roads and population density, the relationship is neither completely linear nor wholly functional. What in fact may be the final generalization is the idea that road building has been guided by the needs of agricultural production for export, rather than the local population's need for accessibility. In a sense, the present road network density is a reflection of the greater emphasis on export agricultural production over the needs of the internal exchange economy.

The Analysis in Perspective

The following summary can now point out certain definite patterns in the road density network. Primarily, the country as a whole has a low road density pattern with significant regional variations. The Northern Province is remarkable for its consistent low road density, which is reflected by the dominance of negative deviations from the national mean.

The reason for this being the combined factors of population, hostile terrain and low level of economic development. The cash crop areas of the Southern Province which also coincide with areas of dense population patterns, have in general, a higher road mileage density than the national average. The peripheral areas, particularly in the swampy south-west coast, are characterized by both low road and population density. The Eastern Province exhibits a high level of road mileage density which again is the combined product of cash crop agriculture and population factors. The Kono District area is unique in that despite a high income level, road densities are low mainly because the principal economic activity - diamond mining, is not usually a generator of a dense road network pattern. The Western Area, as is to be expected, has both high road and population density, but one would guess that for its level of economic development, the road network should have been denser but for the negative factor of a hostile mountain environment.

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CHAPTER 8

FUTURE ROAD DEVELOPMENT

Even a casual appraisal of the national transport system will not fail to reveal the fact that the country, as a whole, is poorly served by all the various transport modes. There is still the need for all categories of road to perform the pioneering function of linking remote areas to the national economy, facilitating increased production, permitting greater human mobility and providing a more efficient means of distributing goods. Thus in any road development plan, stress must not only be on improving the existing network - which no doubt is sorely in need of improvement - but due consideration should also be given to the construction of completely new roads in areas that are, at the present, lacking in all the modern means of transport. The situation in the north-east and south-west portions of the country is a case in point. Development planning, both in Sierra Leone and in other developing countries, has for long recognized the fact that an inadequate transport system is a serious deterrent to increased social and economic development. This fact assumes greater significance when viewed in relation to the nations declared social and economic goals as expressed in the Ten Year Development Plan.[1]

Planning the transport system must of necessity reflect thorough knowledge of the nation's economic potential and the direction of future economic growth. Hence planning should be developed as an integrated process taking all factors of production into due consideration. The emphasis

should be on a transport system that will facilitate the exploitation of natural resources, the efficient linking of urban centres, and the creation of inter-territorial trunk lines that will link the nation's economy with that of her neighbours, and make for greater intra-regional trade.

Planning a road system

Since 1946, several recommendations have been put forward to government concerning the highway system; all envisage substantial road improvement and new road construction. Despite the general agreement on road improvement and new road construction, the various plans, in detail, show appreciable variation as to the social and economic basis for each recommended highway system. For example the 1949 Child's plan envisaged a road system that was primarily intended to meet the needs of a planned increase in the export of agricultural products. On the other hand, Dr. Carney's Ten Year Plan of Economic and Social Development for Sierra Leone (1962/63 - 1971/72), aimed at a road system sufficiently adequate to serve an economy that is gradually being transformed from total dependence on primary exports to one that is more diversified.[2] Lastly the recent report by Transportation Consultants Incorporated (TCI) recommended a 15-Year Master Highway Plan based on the one essential theme of phasing out the government railway and transferring its functions to road transport.[3]

Despite the varied aims of these plans, a constantly recurring problem is that of the future of the railway. There is no doubt that the government railway is an economic liability; it has virtually been operated on a state subsidy which reached the all time high of Le 1.24 million in 1966.

Since the railway has consistently proved its inability to operate on a profitable basis, the logical conclusion is for the railway to be dismantled. This same conclusion has been suggested in several reports, prominent among which is the TCI report which categorically declared:

> **"Due to the inability of the S.L.G.R. to earn its way and due to highway competition which is ever increasing, the inevitable conclusion is to dismantle the S.L.G.R. and allow it to pass into history".**[4]

This recommendation, though based on sound economic reasoning, has not met with government approval. For several reasons, some political, others purely sentimental, government is of the opinion that the railway network could still serve a useful purpose in the economic development of the country. It has therefore declared that it has no intention of phasing-out the railway, and has further outlined a scheme for improvement which envisages the complete realignment of the track, standardization of the gauge from 2ft. 6 ins. to 3ft. 6ins., complete dieselization and personnel recruitment. The above development depends on the availability of foreign capital; for the magnitude of the scheme surpasses the country's capacity to raise the money internally. There is no immediate likelihood that such foreign loans will be forthcoming and the future of the railway remains as uncertain as it is complex.

Since uncertainty and government reluctance seem to surround the fate of the railway, the discussion of future road development must be restricted primarily to those road projects whose execution, is not dependent on

whether the railway is phased-out or improved. Lastly a general road development scheme could be suggested based on the reasonable assumption that in the future, all the forces of economic rationale, financial stringency and overwhelming road competition, would point to the one inevitable conclusion - the phasing-out of the government railway.

Possible Road Projects

At present, it is difficult to obtain sufficient factual information on which to base decisions as to which roads should be improved and what new road construction is necessary. Much reliance is placed on estimates of actual and potential traffic volume and the types of traffic likely to be carried, bearing in mind such things as existing and potential land use, and the distribution and growth of population in the area to be served.

Two distinct kinds of road development schemes may be recognized: improvements to existing roads and construction of completely new roads. In the case of improvements to existing roads, the main motive is to provide a track which is adequate, both for the existing traffic and its anticipated growth, over a period of say ten years. With completely new roads, the motives may be entirely economic, as with a road to open up a productive area; they may be a mixture of social, economic, administrative and strategic elements particularly in the case of new main roads and inter-territorial truck lines. With all new roads it is essential to predict the likely traffic and its rate of growth, so that the road may be designed to suitable standards; furthermore, an indication of the new roads's value will generally be required so that the viability of the scheme may be tested.

Decisions must frequently be made between improving roads on an existing alignment at a cost of about Le 20,000 (£10,000) per mile and complete reconstruction at about Le 40,000 (£20,000) per mile. Where funds are limited, a situation common to most developing countries, the natural tendency is for the cheaper form of improvement, since, for the same amount of money, more miles of road can be improved and the benefits spread over a wider area, affecting the lives of many people. This is a very strong argument. Against it stands the fact that on a road perpetuated on a poor alignment, transport costs are higher than they need have been, an economic waste which multiplies with time and increasing traffic densities. Reconstruction on a new alignment generally reduces route mileage - such reduction may be as high as 10% of the original mileage. The reduced journey time consequent on shorter distances and higher speeds, mean that both passengers and vehicles have more time available for other uses. This saving is likely to have a significant effect on prices when a substantial mileage is done on improved roads.

Evidence both in Sierra Leone and in other West African countries suggests that the effective change from a subsistence to a cash economy is invariably associated with modern transport development. In Sierra Leone a new road usually leads to an intensive use of the surrounding land, the growth of settlements and general population migration from the inaccessible areas to land near the motor road. The proliferation of linear towns right through the landscape is a particular manifestation of the direct connection between new roads and settlements. Although it is extremely difficult to quantify a new road's social, administrative and economic advantages, the

case for it may well be made in more general terms, indicating the size and distribution of population to be served, the area's actual economic situation and the direction of future development given the facilities of modern transport.

Road Improvement

Four major road improvement projects are considered to be of immediate urgency since they constitute important economic and political links in the country. Some of these roads already show signs of congestion, are seriously in need of repairs and at the peak of the traffic season, constitute major traffic bottle-necks. Unless some major improvement work is carried out on these roads, internal economic progress will be seriously hindered and the hoped-for expansion of inter-territorial trade ties is unlikely to materialize. The selection of these four roads is based largely on their future role in the expansion of production and trade both internally and externally.

Freetown - Waterloo Road: This is the most important single stretch of road in the whole country, for it is the only road providing direct access between the port and city of Freetown and the rest of the provincial areas. All imported goods and export products moving by road have to use this 22 mile stretch for distribution and exportation respectively. Unfortunately the quality of the road does not measure up to its importance. It is located in the north-west trending peninsula mountains which rise steeply from the coast to reach heights of over 2,900 feet. The entire area, as seen in Fig. 8.1-A, is heavily dissected by deep steep-sided valleys in which flow numerous mountain torrents. At the lowest levels are

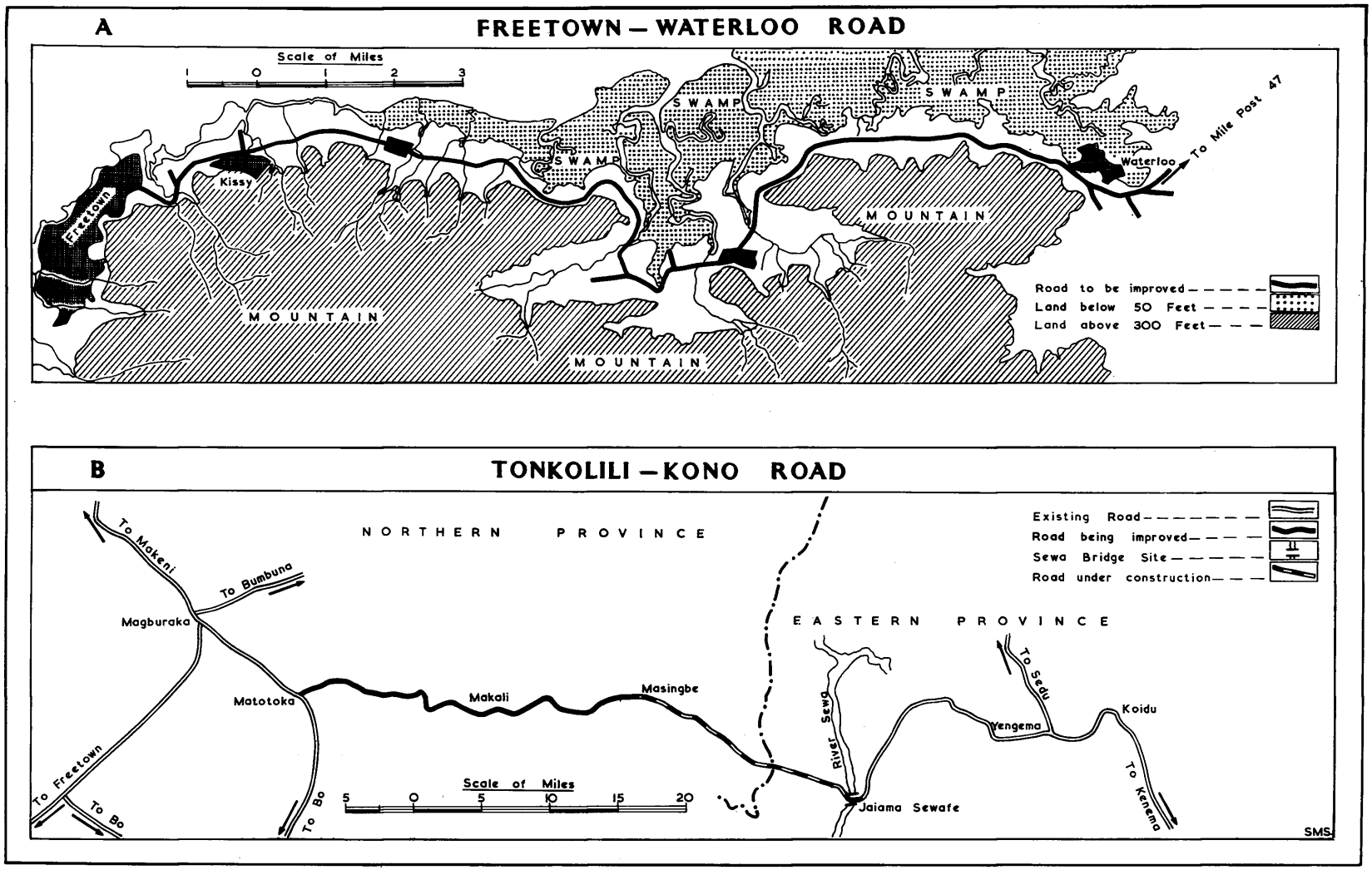

Fig. 8.1. TWO MAJOR ROAD PROJECTS

to be found the inhospitable mangrove swamps. These geographical factors have severely restricted the road to an alignment wedged between the 300 and 50 foot contour lines, thus avoiding the steep slopes and the mangrove swamps respectively. As a result, the road is characterized by numerous bends, narrow bridges and steep gradients, features also seen in the rail track close by. The road is completely bitumenized, but even this has not improved its quality since the bitumen surface was hastily laid by military personnel in the last war. Hence the devious nature of the road, its mediocre quality and its inability to handle efficiently a large volume of motorized traffic.

The urgent need for improving this road is the fact that it handles the greatest volume of highway traffic, over 1,500 vehicles per 24-hour day, increasing at the rate of 25% per annum. The vehicle composition is made up of 60% cars and light vans, and 40% lorries and extra heavy vehicles; the majority of the former represent local traffic plying between Freetown and Waterloo, while the majority of the latter represent through traffic. That the road is presently being taxed above its planned capacity is reflected in the progressive deterioration of the track and the ever present maintenance gangs. Further it is not uncommon for the old delapidated bridges to give way under the continuous strain of increasing traffic and heavier vehicles. The time has surely come to improve this important stretch of road since its growing economic significance dictates the complete rejection of temporary palliatives such as increased maintenance work.

The improvement envisaged involves the total realignment of the road from Freetown to Waterloo. This will virtually mean constructing a new road with three traffic lanes, and bridges made of pre-cast and pre-stressed concrete structures capable of accommodating at least two carriageways. The problem of bridges is of great importance in the total costs since the road will have to span at least 20 streams, giving an average of about one bridge per mile of road. The cost of the whole project was estimated in 1963 to be in the region of Le 2,120,000, but taking into consideration the general rise in labour costs and materials, this same project would now cost about Le 2,500,000.

The benefits consequent on improvement are tremendous. On the local level, there will be an efficient road connecting the rapidly developing industrial estate at Wellington with the growing urban market of Freetown. This will make both for speedy distribution of products and the transportation of raw materials to the industrial site. The overall effect is a reduction in transport costs, which might be reflected in a similar reduction in the cost of the manufactured goods. On the national level, through traffic will be speeded up, road congestion avoided, accidents reduced and the wear and tear on vehicles minimized. Future improved flow of traffic will reduce the cost of transport both to the producers and consumers of the service.

Taiama-Bo-Kenema Road: The road constitutes the major section of main road connecting Freetown with the Southern and Eastern Provinces. It forms the life blood of the nation's economy since it gives direct access to the most

productive areas in the country. It serves the important cash crop area of the south and east and the diamond mining industry of Kono. Since the first section of the road has been realigned and bitumen-surfaced up to Taima, it is considered essential that similar improvement work be carried out on the Taiama-Bo-Kenema section.

Traffic density on the road averages about 500 vehicles per 24-hour day, the majority of the vehicles being heavy trucks engaged in through traffic. As yet there is no serious congestion, but the capacity of this laterite road has long since been exceeded as evidenced by the rapid deterioration of sections like the Koribundu-Blama stretch. It shows a tendency to become only a dry weather road and this has increased with the rapid rise of traffic. In the rainy seasons of 1964 and 1966, the Koribundu-Blama stretch was closed to traffic for a period of over 16 days.[5]

It is therefore proposed that government give immediate consideration to the improvement and realignment of the road. Primarily the entire stretch from Taiama to Kenema should be bitumenized and realigned to shorten the distance, and bypass the Mano-Bumpe-Tikonko area which is liable to severe flooding, since it lies in the flood plain areas of the Tabe and Sewa rivers. This bypass will involve the construction of a sixteen mile road stretching from Taiama due east to Senehun, then veering south to enter Bo from the north. From Bo the road is to follow the present alignment as far as the Sewa bridge, from where a new alignment will go through Telu to join ultimately the Blama-Kenema road at Bangema (Fig. 8.2).

Such proposals entail tremendous financial, social and political implications, but the benefits to be derived will compensate for the disadvantages. On the social and economic level, the proposed Senehun-Bo bypass will surely create trading difficulties for Mano, Bumpe and Tikonko. The TCI report agreed that the bypass from Sewa bridge through Telu to Bangema on the Blama-Kenema highway, would affect a saving of approximately 10 miles between Sewa bridge and Kenema, but cautioned that the project be held in abeyance since the anticipated volume of traffic on the road would be relatively minor. This is surprising in view of the fact that the bulk of the traffic using the Koribundu-Bo road is eastern traffic, and would logically prefer the shorter Bangema-Sewa river bypass to Bo. There is no reason why such traffic, given the facility of a shorter route, would still choose to go through Koribundu. TCI's argument, it is supposed, is the result of hasty conclusion based on limited field work and a rather incomplete appraisal of the origin and destination trend in vehicle movement.

The cost of the entire project is estimated by officials of the Ministry of Works to be in the region of Le 6,000,000 (£3,000,000); this includes the cost of bridging the Tabe river on the proposed Senehun bypass. The new route will shorten the distance from Kenema to Freetown by about 20 miles, create an all-weather road and facilitate the speedy distribution of trade goods, the evacuation of agricultural products and greater human mobility. Transport cost will be reduced since a good and shorter route makes for reduced operational costs, which will be reflected in the cost structure of the industry.

Lunsar-Makeni Road: This road forms the second stage in a road improvement project which was recommended by Rendel, Palmer and Tritton. The first stage involved the realignment and improvement of the 29 mile stretch from Mile Post 47 to the important iron-ore mining town of Lunsar; this was started in late 1962 and completed in early 1964 by Vianini Brothers of Rome. The second stage was scheduled for commencement in the years 1967 and 1968, but has been postponed for various reasons, the most important being financial. It is proposed here that the project be re-evaluated and given priority in the road development process.

The Lunsar-Makeni road is a 42 mile stretch forming part of the main road linking Freetown and the major towns of the Northern Province. It has a 20 foot carriageway, properly aligned and not hindered by curves and steep gradients. The volume of traffic ranges from 200 to 250 vehicles per 24-hour day engaged mainly in the movement of passengers, a few products like palm kernels, and the bulk of the imported goods that are destined for the north. The road at present does not experience any traffic congestion, though it is usually corrugated in the dry season and has many pot holes and extensive mud stretches in the rainy season. Improvement work will mainly be restricted to bituminizing the entire 42 mile stretch, modernizing the few bridges and raising the road bed above the flood level in the Bolilland area. Very little realignment is necessary except for the last 5 miles to Makeni where rock outcrops make it particularly rough. The cost is estimated at Le 2,000,000.

Port Loko-Kambia-Pamelap Road: This is a 47 mile stretch of road giving access to the Guinean capital of Conakry through Forecariah. In the strict domestic context, the road does not really merit immediate improvement; but on the inter-territorial plane, it is of significant strategic and economic importance. The present trend in political thinking stresses the need for mutual cooperation in the field of trade and cultural exchange between Sierra Leone and the Republic of Guinea. To effect this, an efficient transportation link is a vital necessity. Neither the Faranah-Kabal route in the north, nor the Koindu route in the east, are suitable, since these serve peripheral areas and are removed from the real focus of industrial production. Only the Kambia route links the two capitals and their respective industrial regions; hence this road should be developed to facilita the anticipated increase in trade and cultural contact.

It is proposed that the road be bitumen-surfaced and provision for a two lane carriageway be made. Standards of construction should be very similar to the Conakry-Pamelap road which is now almost complete. A major problem in the above project is the presence of two rivers, the Little and Great Scarcies which are at present crossed by mechanically propelled ferries located at the Mange and Kambia crossings. Bridging the two rivers is a logical solution, but the financial costs and the lack of reliable traffic data, either real or potential, makes for caution in any such decisior Having evaluated the present economic situation of north-west Sierra Leone and the potential future traffic from Guinea, it is the author's opinion that immediate bridging of the rivers will neither be justified by the demands of local traffic, nor even by traffic to and from Guinea. The road

should be improved and bitumenized, but the bridging of the rivers should be put in abeyance until such time as actual traffic increases from the present 100 vehicles per 24-hour day to something in the region of 300-400 vehicles. The ferry service is considered adequate to meet the needs of the available traffic, and the occasional bottle-necks noticeable in the Mange ferry must not be interpreted as usual. The ferry service could be improved by extending operations to cover an 18 hour period (7 a.m. - 1 a.m.) instead of the present practice of a 12 hour working period (7 a.m. - 7 p.m.).

The benefits to be derived from such improvements are great, especially if a better road could generate trade with Guinea. However, the scale of benefits is not the same as that for the Taima-Kenema road nor even for the Lunsar-Makeni road; benefits from the Kambia road are less. The area, which is the main region for rice production, is comparatively well served by water transport - a mode economically ideal for the bulk movement of such a comparatively low value commodity. Hence for the internal economy, expenditure on improving the road can hardly be justified, the main justification of the Le 3,500,000 estimated cost, lies in the combination of political and social considerations as often expressed by both governments of Guinea and Sierra Leone.

New Road Construction

The completion of the Mile Post 47 - Lunsar road early in 1964 marked the last phase of major road construction in the country. Most road projects have since been geared mainly to improvement works, the reason being financial and not a lack of demand for such roads. In 1966,

government, after negotiating a substantial loan from the West German government, again embarked on a programme of new road construction.[6] Priorities and cost estimates have still not been finalized and transport reports and feasibility surveys are still in progress to establish these.

Tonkolili-Kono Road Project: This impressive project is commonly called "Joint Venture", since it is financed both by the West German and Sierra Leone governments. It is a 4 million leone, 2-phase project involving the construction of 20 miles of new road including the new Le 15,000 Falima Bridge over the River Sewa, and the improvement of 63 miles of existing road. Phase I involves mainly the construction of a new road and bridge linking Masingbe with Jaiama Sewafe and secondly, the improvement of the Masingbe-Makali road to class I standard. Phase IIb entails the improvement of the Makali-Matotoka road and the Jaima-Sewafe-Koidu road, a total of 48 miles (Fig. 8.1-B).

The importance and benefits to be gained from this road project are tremendous. At present there is no direct east road link between the Northern and Eastern Provinces; Masingbe and Jaiama Sewafe being the respective road termini. From Magburaka, which is a focal road point in the north, there is direct connection to Freetown via Yonibana; but to the east, there is only the circuitous road which leads first to Bo in a southerly direction, then turns east to Koribundu through Kenema, to link up in a northerly direction with Koidu in Kono. The present route alignment is devious and makes road access to the important mining area of Kono very difficult and long. The new Tonkolili-Kono road will not only

provide a direct east route linking the north and east, but will also give a shorter route between the diamond mining area and Freetown. The new route will be only 218 miles to Freetown, a substantial reduction of 90 miles compared to the present road. Further the road will be bitumenized and will make for better east-west communication. It will encourage increased trade between the north and the east and will help in the economic development of eastern Tonkolili District, western Kono and northern Kenema Districts. Lastly it will help divert Kono traffic from the present congested Kenema-Bo road and make for a smoother flow of vehicles.

The cost of the project is estimated to be higher than usual, mainly because of the difficult terrain through which the road has to pass. From Matotoka to Masingbe the topography is not difficult since most of the terrain still lies in the interior plains region which is flat and ideal for road construction. East of Masingbe the terrain becomes progressively difficult towards the Sewa river. The country is hilly and there are several rock outcrops and swamps liable to severe flooding in the rainy season. On the plateau area, the ground is broken by ridges and traversed by several streams. The rainfall is heavy, about 120 inches per annum, 55% of which is concentrated in the period July-September. Hence careful attention is required in dealing with the drainage problem; cement stabilization is recommended especially on approaches to all bridges and on carriageways passing through swamp areas liable to flooding.[7]

Southern Road to Monrovia

For the past 10 years, active consideration has been given to the development of a good road link with the Liberian capital of Monrovia. At present the road link with Monrovia is too long and extremely poor in quality; it has to traverse the entire breadth of Sierra Leone to bifurcate at Buedu in the east, where the more important branch continues east to Foya Kama in Liberia and the other runs due north to Koindu, then east to Konji, and both finally continue due south to Monrovia. The present road link has very little economic significance except for the past lucrative diamond smuggling into Liberia, and an insignificant movement of passengers.

Interest in regional cooperation in the field of economic and trade development, as manifested in the Free Trade Area concept, has resuscitated the need for a direct and good road link with Monrovia similar to the link with Conakry in the north.[8] The first route suggested was to go through Kenema and Joru, then Cape Mount and finally to Monrovia. This road has several disadvantages; primarily its alignment is circuitous and will not create any significant internal development since it passes through an area comparatively well served by roads. The author believes that a road further to the south - starting from Mile Post 47, through Rotifunk, Moyamba, Pujehun across the border a little north of Malema and then to Monrovia, is a better proposition. The advantages of this road lie in the important fact that it will provide a major and efficient link between the south-western quardrant of Sierra Leone and Freetown. The area is just starting to realize its economic potential as already

seen in the establishment of mining concerns at Mokanji (bauxite) and at Mobimbi (rutile). Furthermore the area is rapidly developing mechanical rice cultivation and it is also the projected area for sugar and citrus groves, with the possible establishment of a sugar refinery and a bottling industry. All these large-scale projects involve millions of leones and promise to convert the south-west from a negative region to one that is economically bouyant. But the greatest setback to the full materialization of the anticipated development and sustained growth, is the present inadequacy of the road system. This has been an area for long side-tracked by modern transport links, and has depended to a large extent on slow, uneconomical and inflexible water transport.[9] It is thus considered highly imperative that regional economic planning must of necessity, be an integrated process involving the construction and modernization of roads in the area. This will facilitate not only the movement of machinery for production purposes, but also the efficient evacuation of mineral ores and the speedy distribution of factory products. Hence the southern road will create the desired link to the important market of Freetown and at the same time give reasonable and cheap access to major urban centres such as Bo.

On the international level, the road will provide the much desired link with Monrovia and perhaps in the long run, foster trade with the two countries. The cost of construction is enormous and it is suggested that the venture be undertaken on a supra-national level. Financial negotiation either with the World Bank or the African Development Bank should be entered upon by both the governments of Liberia and Sierra Leone.

The road should be of international standard with a 3-lane carrriageway. Since the new road involves the crossing of a few major rivers, it is suggested that where funds are scarce, such river crossings be temporarily served by mechanized ferries until such a time when actual traffic volume, say 300-400 vehicles per day, necessitate their bridging.

On a long term basis and given that the government railway is phased-out, the whole road system requires drastic modernization and the creation of new main roads. Primarily the entire main road network should be bitumenized and up-graded to at least a 2-carriageway system and the remaining ferries bridged. Among the major constructions in the future are the roads to be developed in the eastern plateau area. The recommended highway system for the nation is shown in Fig. 8.2. The essence of the system is to solidify the nation by providing transport facilities for the movement of persons and goods; to facilitate improvements and increases in agriculture and mining, and to make for social advances which will be gained in the field of medical services, police, defence, and the advancement of political cohesion and national pride.

The recommended national road improvement and construction are based on the one essential theme: that in the not too distant future, the forces of economic retionale and financial stringency will force the government to abandon the railway. As such the road system is planned to serve the actual and forecasted traffic pattern, and to permit movement of people and goods now being transported by the railway. It should serve major areas of agricultural and industrial activity; open up and permit development of areas not now adequately served by any transport mode,

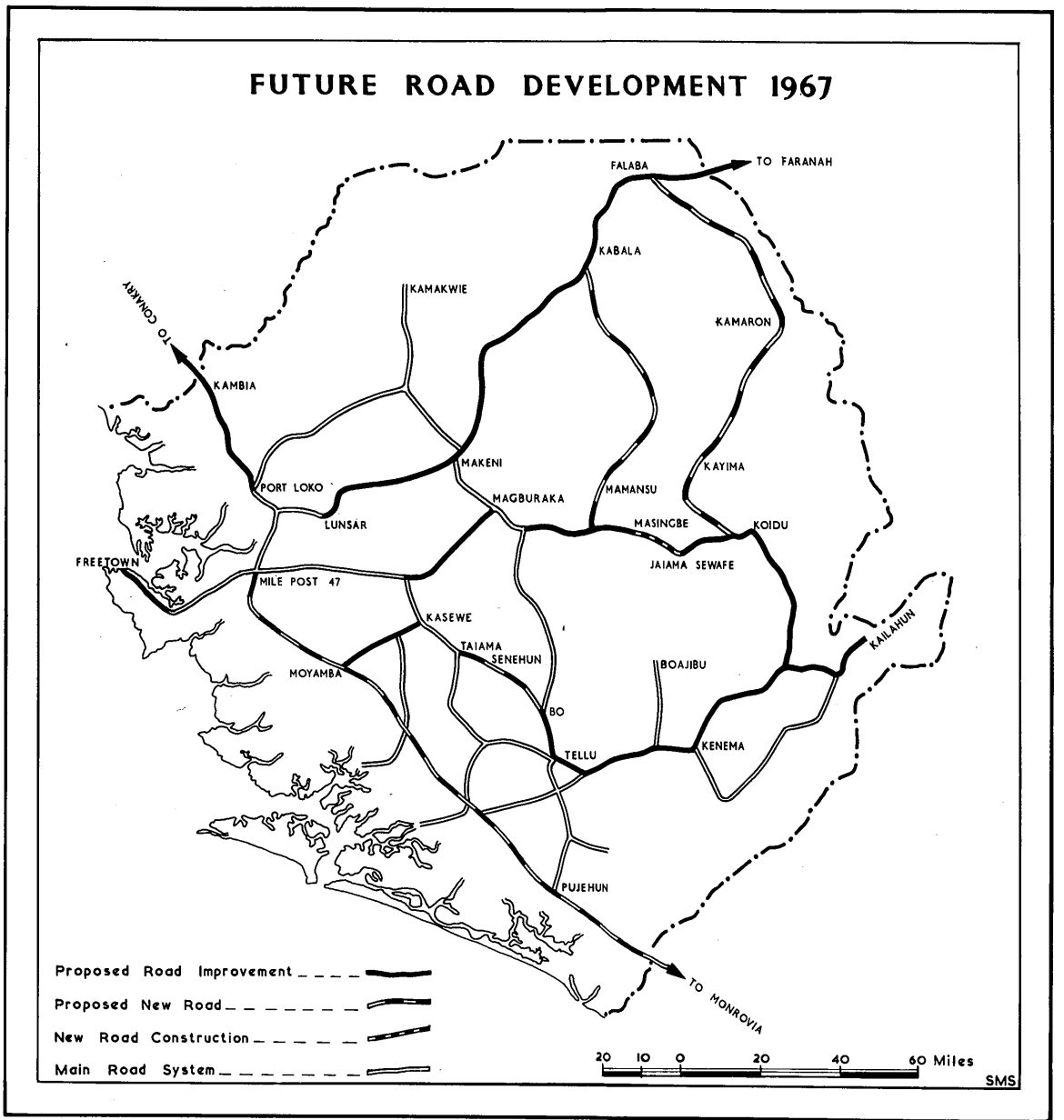
FUTURE ROAD DEVELOPMENT 1967
FALABA
TO FARANAH
KABALA
KAMAKWIE
KAMARON
TO CONAKRY
KAMBIA
MAKENI
KAYIMA
PORT LOKO
MAMANSU
MAGBURAKA
LUNSAR
MASINGBE
KOIDU
FREETOWN
JAIAMA SEWAFE
MILE POST 47
KASEWE
KAILAHUN
TAIAMA
SENEHUN
BOAJIBU
MOYAMBA
BO
TELLU
KENEMA
PUJEHUN
TO MONROVIA
Proposed Road Improvement
Proposed New Road
New Road Construction
Main Road System
20 10 0 20 40 60 Miles
SMS

Fig. 8.2.

and produce a transport system necessary to the economic and social development of the nation.

Financing the Programme

The magnitude of the initial road priorities already stated are such that new avenues of finance are urgently needed. The emphasis lies in the creation of a Highway Authority to be run on a self supporting and self-financing basis. If its operations are to continue on a self-sustaining basis, laws should be enacted which will guarantee that all revenue collected for road purposes, be reserved for exclusive expenditure by the Highway Authority, so that it can plan the rational development of the road system as outlined earlier. Sources of revenue must not be restricted to foreign aid and loans, as is today the common practice in most developing countries; internal revenue sources must be stringently exploited and new radical measures, though initially unpleasant, should be introduced to help finance the various road projects.

Primarily it is suggested that all revenue relevant to road transport be excluded from the general government revenue and set aside for the Highway Authority. Secondly, that appropriate tax increases be made on items like diesel oil so as to make road users pay for the roads. Finally a toll system could be introduced on some major roads such as the Freetown - Mile 47 road as an auxiliary source of revenue. Experience in fuel consumption patterns indicate that an expansion in road transport is invariably followed by an increasing use of diesel fuel as compared to petrol. Such an increase is the direct result of expansion in numbers of heavy trucks such as the Japanese 7-ton diesel Toyota, as well as a

definite increase in the mileage run by vehicles. Since these vehicles are operated mainly on a profit basis and not as a social service, it certainly follows that the entrepreneurs should bear their fair share of maintaining an adequate road system. It is therefore proposed that taxes levied on motor fuels reflect the additional road use benefit to be obtained per gallon of diesel fuel as against petrol. Evidence suggests the critical fact that diesel powered engines have an operational advantage over petrol vehicles, in that diesel consumption is usually two thirds that of petrol for the same amount of service out-put, and further, the cost of diesel fuel is normally less that of petrol.

A general tax of 15 cents per gallon of motor fuel is thus suggested. It should be emphasized that the tax increase must only be applicable to fuel used directly in road transport; other large consumers like ships, electricity corporations and stationary machinery, should be exempted. Thus out of the 41 million gallons of diesel imported in 1965, only 50% or 20.5 million gallons went directly to road transport, and it is only this proportion that should be liable to the tax increase. Further all import duties and licence revenues on commodities pertaining to road transport should be put exclusively for the use of the Highway Authority. The revenue that will accrue to the authority in 1965 if it were in operation, has been worked out in Table 8.1, based mainly on 1965 statistical data.

TABLE 8.1 REVENUE OF HIGHWAY AUTHORITY 1965

Tax on Diesel Fuel	(20.5 million gallons)	=	Le	3,000,000
Tax on Petrol	(8 million gallons	=	Le	1,200,000
Tax on Lubricants		=	Le	5,000
Import duty on vehicles		=	Le	500,000
Vehicles Licences		=	Le	500,000
Vehicle Registration		=	Le	25,000
	Total			5,230,000

Source: Central Statistics Office, Freetown

In addition to the above Le 5,230,000, there is the additional revenue of about Le 2 million to be earned from toll roads. The toll road revenue is a conservative estimate, since it is expected to be applied on only one or two major roads, the most important being the Freetown-Mile 47 road, where a minimum daily traffic of 400 vehicles will easily earn over one million leones per year at the small average cost of 10 cents per journey per vehicle. The potential earning capacity of toll roads cannot be doubted; there is indeed a serious danger of initial hostility by road users to the toll-road idea, but this should not deter government from the reasonable exploitation of this revenue source.

The above revenue, estimated at about 7 million, is expected to provide for maintenance costs and to service loans which the Highway Authority would incur in its major road projects. Government should give grants to the Authority and substantial sums from the development budget should be expended on roads. The repayment of loans, it is suggested, ought to be a government responsibility while servicing the loans should be left with the Highway Authority.

Conclusion

There is no doubt that the profitability of roads reflects the general level of prosperity in Sierra Leone. In the post-war years, roads were rightly recognized as transport media capable of independent development, and substantial sums were infused into them in order to make them fit for the use of modern road transport. The results of that expenditure has achieved substantial improvement in highway transportation. The work is far from complete on the highway system - but as more and more is achieved, the prospective yields from those that are left will be less significant than for the earlier projects. It will be at this critical period that competition for funds from other fields of development will become important. Road transport, both in the public and private sectors, can claim to be one of the country's most important industries. No other activity can function efficiently without it. Though the capital value of roads and the stock of vehicles is not precisely ascertainable, yet together, they constitute one of the country's most important capital assets. Ultimately, it is this overwhelming significance of modern road transport to the national economy, coupled with its future development and growth, that should justify the huge expenditure on roads.

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CHAPTER 9

INTERNAL AIR TRANSPORT

A fundamental difficulty in the economic operation of domestic air services is the small and compact nature of the country, and the inevitable short hauls involved. In contrast to Nigeria, Mali or Ghana, the minimum sector distance of 180-200 miles which is necessary for the economic operation of fixed wing aircraft, is never achieved in Sierra Leone. The maximum sector distance is the 168 miles from Hastings to Daru, but direct flights are seldom operated owing to lack of demand. The average sector distance for the principal air route (Hastings-Bo-Kenema-Yengema) is only 108.6 miles, a distance far below the economic minimum for fixed wing aircraft. Hence the advantages to be derived from air transport by linking widely separated parts of a territory are not relevant to Sierra Leone. In this the country differs from the majority of West African states.

A positive advantage of air transport is the fact that, in a developing country like Sierra Leone, other modes of transport are often slow and, where speed is essential to convey personnel, spare parts, medicines and other urgently required supplies, the only recourse is to air transport. A further technological advantage of air transport is that seasonal contrasts in weather conditions do not particularly affect it. In many areas of West Africa climatic variations adversely affect the operation of surface transport media. Road transport in particular, and railways in general, are often totally or partially interrupted by floods during

the rainy seasons. Inland water transport is also immobilized by fluctuating water levels. Air transport, on the other hand, is virtually free from such interruptions and can continue to serve areas which would otherwise be cut off from the rest of the country. This climatic factor goes far to explain why demand for air transport shows a definite upward trend in the rainy season, a time when road transport is severely restricted by the fact that many stretches are impassable.

As in most other countries of West Africa, demand for commercial air services in Sierra Leone is only latent; actual demand is restricted by the general low per capita income of the population. Such a situation usually leads to the uneconomic under-utilization of aircraft capacity. Further, the inevitable short hauls, coupled with a low load factor severely militate against the profitable operation of air services. Passenger movement constitutes the bulk of traffic while freight is restricted to the conveyance of goods of high unit value. Hence the most rapid development has occurred in the passenger sector, a phenomenon common to all internal air services of West Africa. However, the period 1964-1965 saw an appreciable change in the pattern of freight traffic in that the present trend indicates a considerable widening of freight types, prominent among which is the up-country movement of imported perishable goods like frozen meat. The success of this traffic might ultimately lead to the more profitable bulk movement of meat from the cattle areas of the Northern Province to large urban centres like Freetown and Bo, with a back haul of fish freight to the northern centres. Such internal air freight movement has been successfully operated between the savanna cattle areas

of Mali, Niger and Chad and the coastal urban centres of Ghana, Ivory Coast, Togo, Dahomey and Nigeria.

Historical Development

In comparison to Ghana and Nigeria, the development of internal air services in Sierra Leone is recent, and did not follow the same pattern. Although air services came as a logical sequence in the general evolution of sophisticated transport modes, they tend to perform a special function in Sierra Leone. The introduction of aviation in British West Africa by 1930 saw the establishment of small inland centres which were used only as stages on inter-colonial routes. Such centres developed mainly in Ghana and Nigeria; in Sierra Leone, only the coastal city of Freetown was served. Even after the Second World War, when a more comprehensive route network was organized by the West African Airways Corporation (W.A.A.C.), based on the recommendations of the Sanford Report (1944)[2] and of C.B.H. Cross (1946)[3], it was stated that "no regular domestic services were needed in Sierra Leone. The existing needs could be covered by two aircraft operated on a charter basis".[4] Such an attitude to the establishment of regular internal air services was based on the following geographical and economic facts.

In the first place, feeder services linking up-country centres to the international route were unnecessary since the bulk of the potential users of such services was, by 1948, concentrated in the Freetown area. Secondly, provincial headquarters were all linked to the centre of government in Freetown by the railway and road system. Lastly, economic

development in the provinces was not sufficient to provide enough traffic for air services linking the major commercial centres. These negative factors led to the exclusion of Sierra Leone from the W.A.A.C. network of regular domestic air services.

The great break-through came in the 1950s with the rapid growth of the country's economy and the consequent development of actual demand for internal air services. Such economic development was largely a factor of the opening up of the diamond mining areas to direct African participation, and the rationalization of the operations of the Sierra Leone Selection Turst (S.L.S.T.), and the Diamond Corporation (D.C.S.L.). These created centres of economic activity like Bo, Kenema and Yengema, but the absence of a good high-speed road net linking these areas with Freetown necessitated the urgent introduction of air services. Thus, unlike the railway, internal air services came to satisfy an already existing demand and to supplement the inadequate land communications in the country.

The Domestic Fleet.

Six aircraft comprize the domestic airfleet. Of these, two are owned and operated by Sierra Leone Airways (SLA), which exercises a monopoly over commercial air transport in Sierra Leone. There is as yet no military aviation; the other aircraft are privately owned. SLA is a stock company capitalized at Le 100,000 (£50,000) and formed in 1961 by agreement between the government of Sierra Leone, which holds a 20% stock interest, and British United Airways (BUA), which owns 70% of the stock. The other 10% is held by various interests. The primary objective of SLA

is to establish a comprehensive network of internal air services for the regular conveyance of passengers, mail and freight between specified points on air routes.

The agreement setting up Sierra Leone Airways provides, inter alia, that the company, for the life of the agreement, receives the following concessions:

(a) exemption from duty on aviation oil, fuel and spares

(b) Free use of government airfields, aeradio, meteorological services, hangars and other terminal installations

(c) exemption from taxes including income and surtaxes.

Further it receives a fixed sum from BUA for the privilege of operating the Freetown - London flight. Finally government agreed to pay a subsidy to the company in the event of a deficit in operations in the first five years (1961-1966). The economic rationale behind such a subsidized air service is questionable as has been suggested by a team of transportation consultants who, in their 1963 Transportation Survey of Sierra Leone, stated that "the likelihood of the air service ever being able to support itself, is remote".[5] Nevertheless there are factors which suggest that, given further economic development, the service might eventually pay for itself. Even if financial prospects are not sufficient justification for the air services, the government believes that social and political considerations are stronger arguments for their continuation. The inevitable incompatibility between the service objective of the government and the profit motives of SLA is not peculiar to Sierra Leone. Subsidized

internal air services have been established in several West African countries for reasons of state.

Traffic Pattern

Fig. 9.1 shows two features which reveal the relative importance of air transport over the inadequate surface communications. Firstly there is a large number of centres served. In Sierra Leone, despite its small size and compact shape, there are five centres with regular air services. Secondly, Sierra Leone with her extremely short sector distances is unique in West Africa. The longest non-stop stage is between Hastings and Bo, a distance of 99 miles; that between Bo and Kenema is 39 miles. The centres served show a disparity in relative importance as is reflected in service frequency and total passengers handled. From casual observation, it would appear that traffic volume on the various stages is a function of town size and distance between the towns. But a more detailed analysis will show that traffic does not always vary directly with stage distance.

As has been suggested earlier, distance is a key factor in the network. Short inter-city distances usually create problems of surface competition and the resulting low load factor on such routes is uneconomic. The greatest appeal of air services lies in the saving of time, but this can only be effectively realized where distances are great. With short distances, time taken to and from the airfield added to time spent in taking-off and landing, constitutes a large proportion of total travelling time, and nullifies the time advantage the aeroplane has over

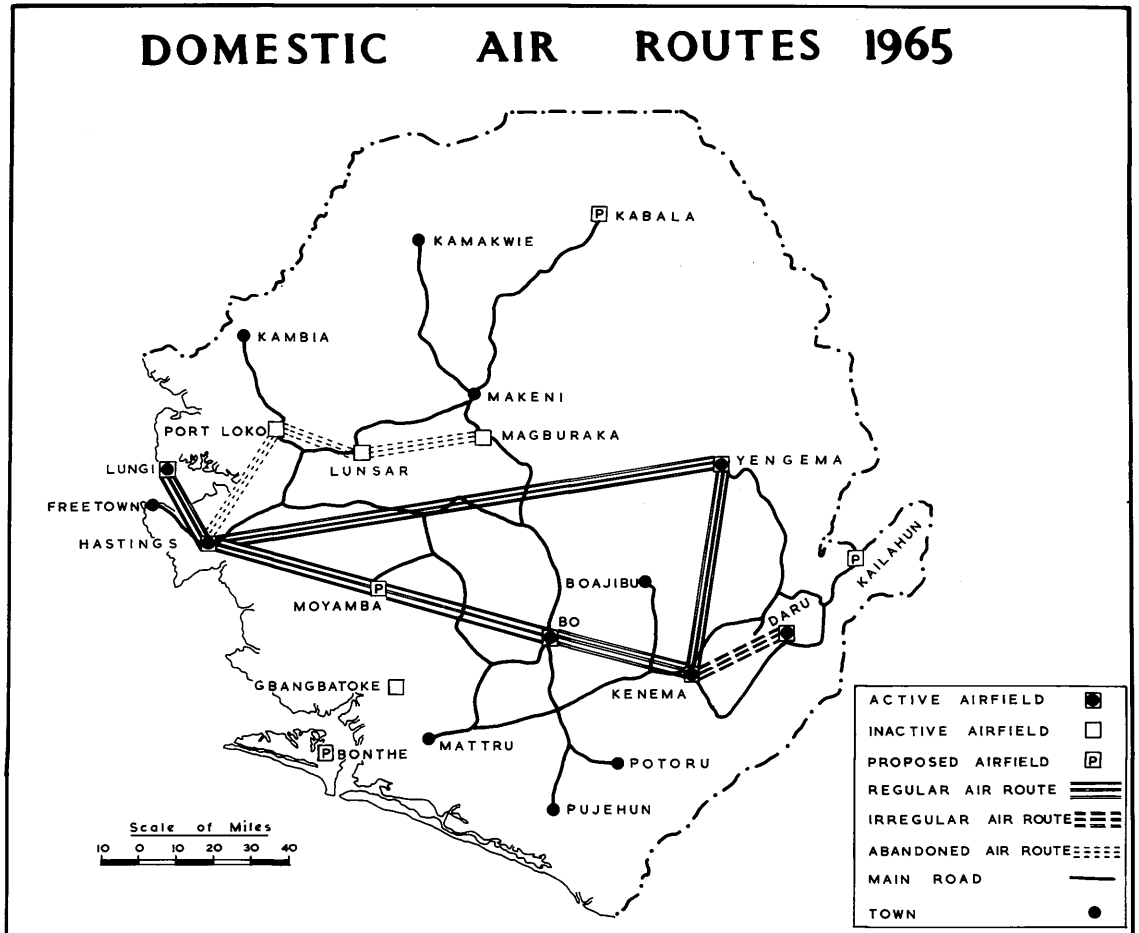
DOMESTIC AIR ROUTES 1965
KABALA
KAMAKWIE
KAMBIA
MAKENI
PORT LOKO
MAGBURAKA
LUNGI
LUNSAR
YENGEMA
FREETOWN
HASTINGS
KAILAHUN
BOAJIBU
MOYAMBA
BO
DARU
GBANGBATOKE
KENEMA
BONTHE
MATTRU
POTORU
PUJEHUN
Scale of Miles
10 0 10 20 30 40
ACTIVE AIRFIELD
INACTIVE AIRFIELD
PROPOSED AIRFIELD
REGULAR AIR ROUTE
IRREGULAR AIR ROUTE
ABANDONED AIR ROUTE
MAIN ROAD
TOWN
SMS

Fig. 9.1

surface transport modes. Hence over 50% of total traffic is concentrated on the comparatively long distance routes linking Hastings, Bo, Kenema and Yengema. The short distance routes, especially that between Bo and Kenema, carry a very small proportion of total traffic. Table 9.1 based on the SLA 1964/65 monthly figures, shows that in the Sierra Leone experience, traffic volume varies directly with stage distance.

TABLE 9.1 DISTANCE FACTOR IN TRAFFIC VOLUME

Stage	Total Passengers	Distance By Road	Distance By Air	Flying Time
Hastings - Bo	1,641	186 miles	99 miles	45 mins.
- Kenema	2,621	230 "	138 "	1 hr. 30 mins.
- Yengema	2,682	316 "	144 "	2 hrs. 15 mins.
Bo - Kenema	547	62 "	39 "	25 mins.
- Yengema	609	148 "	67 "	1 hr. 10 mins.
Kenema - Yengema	955	89 "	52 "	30 mins.

Comparison of road and air mileages separating the various centres suggests that the critical factor is not air distance but road distance. Passengers usually consider air transport an alternative to surface transport, so that the longer the road mileage between two towns, the greater the potential for traffic along the air route. This is much more so with poor quality roads where time consumed in travelling is dispropor-

tionately great. Hence distance and quality of road are two important factors in determining the volume of air traffic.

Further, it also appears that volume of traffic may be a function of town size. Several methods have been suggested for correlating town size with passenger traffic, the simplest being to plot total population against total passenger traffic for each town. A further step would be to work out a Traffic Capacity Index per thousand of population for each town. Such a simplified approach is illustrated in Table 9.2,

TABLE 9.2 TOWN SIZE FACTOR IN PASSENGER TRAFFIC

Town	Population 1963	Passengers	
		Total	Per '000 Population
Freetown	128,000	7,891	61.7
Bo	26,498	2,797	105.6
Kenema	13,364	4,123	308.5
Yengema	2,882	4,241	1471.6
Daru	1,739	29	16.8

but the results show no direct correlation with town size. For example, Yengema has an index of 1471.6 passengers per thousand of the population while Daru has only 16.8. The discrepancy is further highlighted when a more detailed statistical method is employed as shown in Table 9.3.

The result indicates that the higher the percentage value, the greater the deviation from the mean and the less there is a correlation between town size and volume of passenger traffic.

TABLE 9.3 PASSENGER TRAFFIC PATTERN

Town	x	$\bar{x}$	$\frac{\bar{x}(100)}{\text{Mean}}$
Freetown	61.7	331.2	84.4%
Bo	105.6	287.2	72.9%
Kenema	308.5	84.3	20.8%
Yengema	1471.6	1078.8	277.0%
Daru	16.8	376.0	95.6%
	392.8		

$$\text{Mean} = \frac{1964.2}{5} = 392.8$$

x = Number of passengers per thousand of population.

$\bar{x}$ = Deviation of x from the Mean

$\frac{\bar{x}(100)}{\text{Mean}}$ = Percentage deviation of individual towns.

The percentage deviation in descending order of magnitude is as follows: Yengema, Daru, Freetown, Bo and Kenema. The above fact is further evidence that town size is not the main factor influencing the volume of passenger traffic. The main economic activity of the various centres, the influence of diamond mining being particularly apparent, is the

essential factor in passenger traffic. An attempt will be made to treat the various centres in terms of functional significance in order to correlate type of economic activities with passenger generating potential. Usually, people engaged in business requiring speedy conveyance provide the bulk of passenger traffic. Among such business enterprises, mining is the most important; then follows large scale commerce; lastly comes administration which, though not a regular user of air services, does occasionally resort to such services. With these in mind, it can be generalized that centres located in important diamond areas will have a greater traffic potential than those which are not. Table 9.4 illustrates the point by showing spheres of influence for the various centres and the occupational structure of each centre, including its economic hinterland. The results of the above analysis, though not detailed enough, are however adequate indication of the traffic potential for each centre based on the occupational structure of the centre and its traffic hinterland.

Yengema. A rapidly growing town with a population of 2,882 (1963) of whom 74.7% are fully employed, is situated in the heart of the richest diamond area in the country. It is also the mining headquarters of S.L.S.T., the biggest diamond enterprise in Sierra Leone. Although the town itself is in no way the commercial centre for the region, nor even its administrative headquarters, it is of great economic significance in that it possesses the only airfield in the area which serves as its traffic hinterland. This hinterland mainly comprises diamond mining towns which provide the best

TABLE 9.4 AIR CENTRE TRAFFIC POTENTIAL

Air Centre	Traffic Hinterland	Total Working Population	Occupational Structures		
			Mining	Commerce	Administration
FREETOWN		39268	115	12415	8612
	Kissy	3396	14	739	831
	Wellington	1431	11	348	157
	Wilberforce	2392	21	343	1476
	Murray Town	1217	3	182	435
	Waterloo	959	3	352	146
	Lumley	708	5	131	208
	Goderich	770	1	157	34
	Total	50136	173	14667	1884
BO		5695	60	1631	1314
KENEMA		3844	49	1190	629
	Blama	1559	258	594	172
	Panguma	1056	126	135	53
	Barma	3545	1893	627	96
	Boajibu	2015	686	374	122
		12019	3012	2920	1072
YENGEMA	Total	2184	1106	282	428
	Jaiama Nimikoro	1244	86	116	75
	Jaiaima Sewafe	2723	1161	346	121
	Koidu	3584	131	1210	376
	Sefadu	327	15	32	85
	Sukudu	1621	716	121	19
	Total	11692	3215	2107	1104

Source: Central Statistics Office (Freetown) Unpublished Data 1964

market for air services. (Fig. 9.3). Allied to diamond mining is a large and thriving commercial population serving a total number of 3,215 diamond miners. When one considers that this area is poorly served by roads, the great demand for air transportation can easily be appreciated. Its percentage deviation of 277 from the mean, further emphasizes the special function of air transport in the region and is easily the best market in the entire domestic air service. One striking feature is the small number of the service population which goes to show that administration is an insignificant factor in providing traffic.

Kenema. Next in order of importance is Kenema. Like Yengema it is situated in a diamond mining area. It is not only a provincial headquarters, but also an important railhead and a focus for motor roads. Hence in terms of surface communications, it is better served than the Yengema area. Its traffic hinterland includes mainly diamond mining centres such as Barma, Boajibu and Blama. The total mining population of 3012 is almost equal to that of the Yengema area. However, the air traffic potential of Kenema is far less, a situation which can partly be explained by greater competition from surface transport. More important is the fact that diamond production in the Kenema area is hampered by two factors. Firstly, the deposits in the area are neither large nor rich enough to be compared with those in the Yengema area. Secondly, the bulk of diamond mining is carried out by African exploiters whose fragmented, unmechanized and

poorly capitalized enterprises are not conducive to large-scale and profitable mining operations. This is in direct contrast to the highly capitalized, efficiently organized and modernized mining by S.L.S.T. at Yengema. This contrast is not only reflected in production figures but also in air traffic. The highly organized mining operation of Yengema is a better source of air traffic than the fragmented and unorganized "diamond rush" in the Kenema area. Commerce and administration, because of the better surface transport facilities, especially within the operation of the price incentive, contribute even less to air traffic than at Yengema. Hence Kenema, despite its size, administrative and commercial importance, provides a smaller market for air transport than Yengema.

Bo. In contrast to Yengema and Kenema, no single factor can be used to explain the demand for air transportation in the Bo area. A combination of administration, diamond buying, and commerce, seem to be the significant factors. As can be seen in Table 9.4, the rapid growth of Bo has retarded the development of any significant urban centres in its hinterland. The settlements in its traffic hinterland are not prosperous enough to provide air traffic. Further, Bo itself is neither an important mining centre nor even situated in a rich diamond mining area, but because of its size (26,498 persons in 1963), and administrative importance as the provincial capital, it has attracted a sizeable number of administrative and commercial personnel who provide the bulk of the passengers. A striking feature in Bo is the minor role played in the economy by the diamond industry, which is to a large degree reflected in the comparative small number of air passengers as is illustrated by its 72.9% deviation from the mean.

Freetown. The figures for Freetown only refer to domestic air transport and totally exclude international flights. Hastings, 18 miles from Freetown, is the domestic airport while Lungi is used for international services. With these in mind, the actual air traffic figures of Freetown far exceed those presented in this thesis, an unavoidable situation since the thesis itself is limited largely to internal transportation. However, in 1964, total passengers handled at Lungi were about 19,000 while Hastings handled only 7,070. Thus although Freetown has the greatest passenger volume of all internal air centres (See Table 9.3), for its size, its traffic index of 61.7 is actually small. This can be accounted for in several ways. First, the traffic index refers only to internal air transportation. Unlike such centres as Yengema and Kenema, Freetown hardly has any mining industry, as seen in Table 9.4 where the total mining population is just 173, all of whom are employed in quarrying. Hence it depends on a large number of administrative and commercial personnel to provide the bulk of its traffic. These groups, however, do not usually provide a good source of traffic which further goes to show why the traffic generating capacity of Freetown is so low. The true traffic hinterland of Freetown actually embraces the whole country, but the traffic so generated is largely channelled to the international airport of Lungi. The capital city of Freetown has a percentage deviation of 84.4% indicating that its total internal passenger traffic is far below the expected figure for a town of its size. However, its future as an air centre is bound to be enhanced by the growing concentration of political power, industries and population in the Western Area.

Daru. Daru provides a good example of an air centre in an area with hardly any economic demand but with such strategic significance that the service is considered necessary. It has an important military barracks close to the eastern frontier. Its inadequate and unreliable surface communication necessitates air transport to provide speedy and reliable movement of personnel in any emergency threatening the national security of the state. Because of this specialized function, not only are services irregular, but the volume of air traffic is very small. The uneconomic nature of air transportation in the area is further reflected by the low traffic potential of 16.8 and a percentage deviation of 95.6. With the present political fragmentation of West Africa, air centres like Daru are bound to continue because of their strategic significance. On the other hand, any political rapprochement between Sierra Leone and her neighbours will reduce the strategic importance of Daru. For the present, the country will go on subsidizing air services to Daru mainly for its military significance.

Growth Trend in Air Traffic

An appreciable amount of growth has taken place in the industry especially in the 1964/65 period. Again Yengema and Kenema have shown the faster rates of increase while Daru actually registered a decline. Such rates of growth are to a large extent factors of economic activity and competition from surface communication, especially road transportation. Table 9.5 portrays the overall growth in traffic and the individual trends in the various air centres.

TABLE 9.5 GROWTH OF AIR TRAFFIC 1962/63 - 1964/65

Centre	Number of Passengers 1962/63	1963/63	1964/65
Freetown	6242	7070	7891
Bo	2560	2513	2797
Kenema	2973	3183	4123
Yengema	2996	2999	4251
Daru	32	41	29
Total Passengers	14803	15806	19091
Total Freight (Kilograms)	51764	91076	104744

Source: S.L.A. monthly Traffic Reports (Unpublished data)

In operating a commercial air service in an underdeveloped country, several factors, financial and social, tend to militate against the rapid economic expansion of the service. In Sierra Leone, air fares are generally based on the available volume of traffic and since traffic is generally low, the service is inevitably expensive to the consumer. Passenger air fares are very high and in simple economic terms, not competitive with other transport modes. For example the average cost per passenger/mile in the domestic service is 12.5 cents while in the external service it is only 6.3 cen

For road transport the figure is about 1.2 cents, giving a ratio of 6:1 or that the passenger/mile cost for road transport is only 16.6% that of domestic air service. For a population that is still quite poor, the price factor alone is enough disincentive to the use of air transport. The position would have been better if greater distances were involved, but since the stage distances are usually short, even the time incentive is not strong enough to attract passengers. Road transport is very competitive in the short distance stages as is seen in Table 9.1 where air passenger volume varies directly with stage distance.

The growth trend in freight traffic has been mainly a factor of economic development and road competition. All sectors of freight traffic registered steady increases in the early formative period giving the most rapid rates of growth. Of the three freight classes, general freight has been the most promising and, measured in Kilogram-miles, increased by 242.9% between 1961 and 1962. Mails have shown the slowest rate of increase. The pattern of mail and newspaper freight is a simple function of town size, while general freight distribution is more complex and largely controlled by the degree of economic activity of individual centres. 80% of general freight comprise eastbound traffic originating from Hastings, while the reverse flow originates from the other three centres of Bo, Kenema and Yengema. Yengema is by far the largest receiving centre and, like Kenema, receives more freight than it despatches. Conversely, Hastings and Bo despatch more freight than they receive.

TABLE 9.6 DISTRIBUTION OF GENERAL FREIGHT TRAFFIC 1964/65

Air Centre	Despatched	Received	East Bound	West Bound
Yengema	2459	24381		
Kenema	3389	7369	37915	8827
Bo	4289	2758		
Hastings	32819	5316		

Source: S.L.A. unpublished Traffic Data.

This pattern in Table 9.6 emphasizes the general trend in domestic freight movement. The imbalance of freight flow with a preponderance of eastbound traffic is also a feature of road and rail transport. The bulk of the traffic comprises imported goods (east-bound flow). Hastings acts as the main distribution centre for air transport just as Freetown does for road transport. The up-country centres are mainly receiving points, a feature which is not duplicated in the case of road transport; for although traffic imbalance is noticeable between the up-country and down-country flows, centres like Bo, Kenema, Makeni and Kabia are important distributing and collecting points for road traffic.

Seasonal Variation of Traffic

Fig. 9.2 is an attempt to portray the seasonal variation of traffic using the latest datd (1964/65) as representative. One striking feature is the similarity in pattern of variation for both passenger and freight traffic. As is often the case in underdeveloped areas with a poor surface communication network, air traffic reaches its peak in the

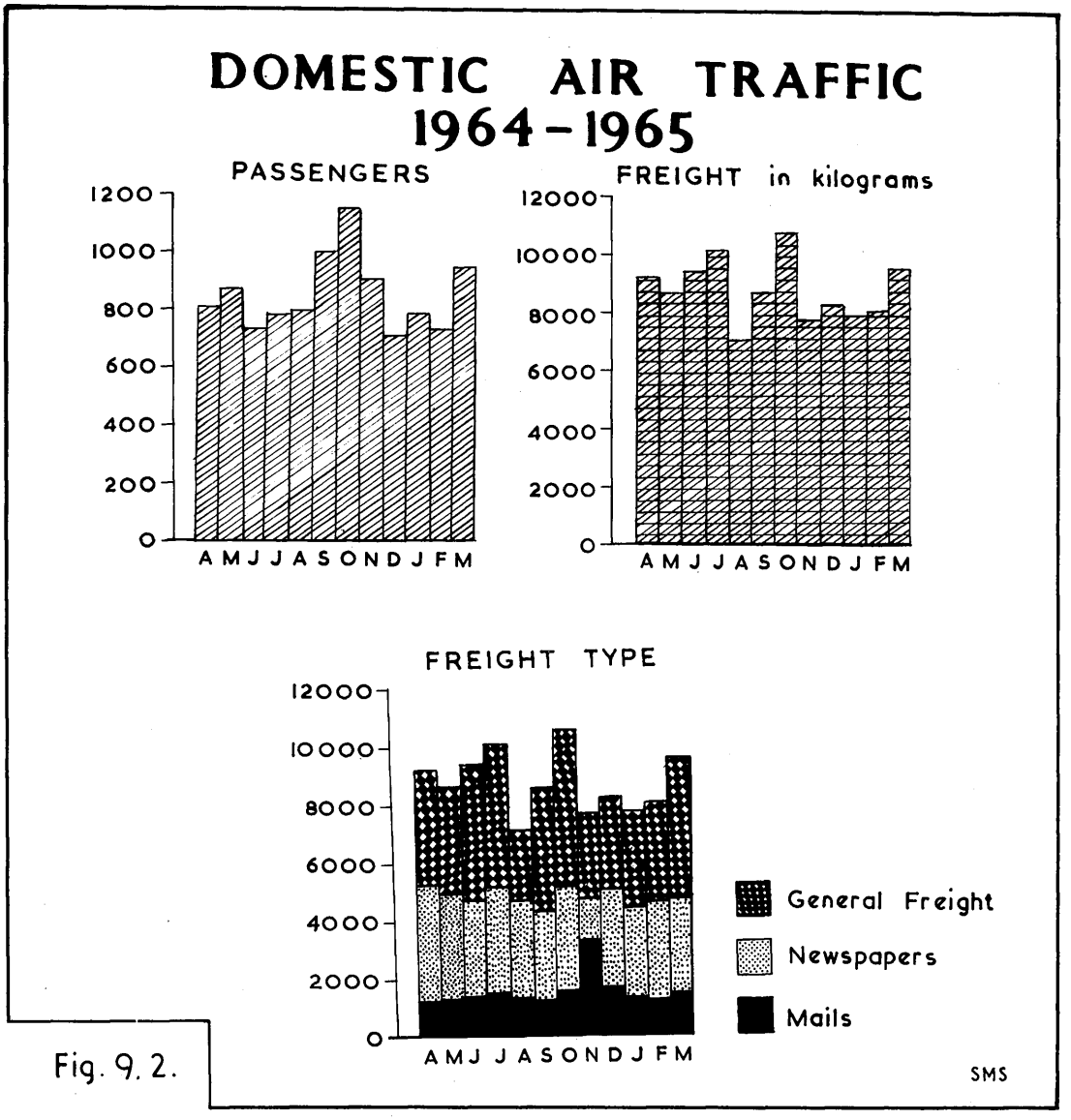
DOMESTIC AIR TRAFFIC
1964 - 1965
PASSENGERS
1200
1000
800
600
400
200
0
A M J J A S O N D J F M
FREIGHT in kilograms
12000
10000
8000
6000
4000
2000
0
A M J J A S O N D J F M
FREIGHT TYPE
12000
10000
8000
6000
4000
2000
0
A M J J A S O N D J F M
General Freight
Newspapers
Mails
SMS

Fig. 9. 2.

rainy season when road surfaces deteriorate, and restrict the speed of surface communication. On the other hand, air traffic is lowest in the dry season, for at this time the road quality has improved and speed of movement is enhanced. Climatic control, though the most important factor influencing seasonal variation of traffic, often operates in conjunction with other factors like peak trade period to produce the final pattern of variation. Hence August, the peak of the rainy season, also has the lowest volume of traffic, for at this time economic activity and trade are at such a low ebb as seriously to reduce total volume of traffic. In the dry season, the general briskness of the economy, despite intense road competition, provides a substantial amount of air traffic to modify upwards the tendency to low air traffic volume in this period.

Variation in type of freight is more complex. Fig. 9.2 shows that both mails and newspapers exhibit only minor fluctuations, the only exception being November, when mails attain the all year peak of 3,291 kilograms while newspapers drop down to their lowest level of 1,431 kilograms. The rise in mails is explained simply by the Christmas season while the drop in newspapers might be due to competition for space between the low-rated newspapers and the high-rated mails. Much more important is the variation in general freight. Because general freight comprizes 50% of total freight, its variation is of such magnitude as to determine the general seasonal pattern of total freight. Peak period of movement occurs in the months of June, July and October.

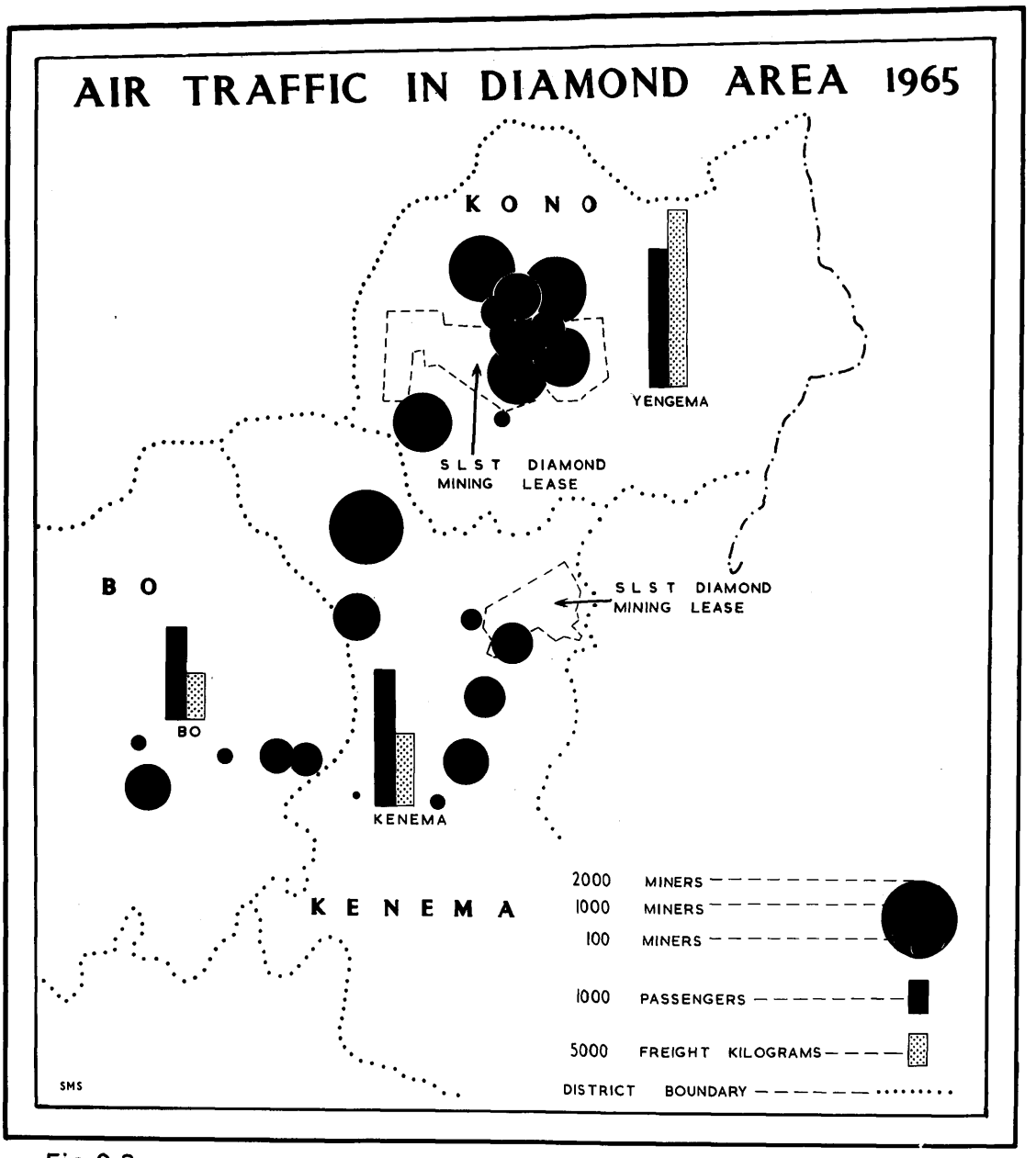
AIR TRAFFIC IN DIAMOND AREA 1965
K O N O
YENGEMA
S L S T DIAMOND MINING LEASE
S L S T DIAMOND MINING LEASE
B O
BO
KENEMA
K E N E M A
2000 MINERS
1000 MINERS
100 MINERS
1000 PASSENGERS
5000 FREIGHT KILOGRAMS
DISTRICT BOUNDARY
SMS

Fig.9.3.

A detailed analysis of the correlation between traffic trends and the seasons reveals a substantial time lag. The onset of the rainy season does not immediately lead to a deterioration in surface communication, hence the switch to air transportation is not really noticeable in the early period of the rainy season. By June the switch starts to take place and air traffic continues to grow right on to the early period of the dry season, when the road network is still recovering from the effects of the rainy season.

Utilisation of Capacity

Studies of air transportation in West Africa has often reiterated the latent demand for such a service and the restricted nature of actual demand due to high costs. In Sierra Leone the situation is much more acute with consequent under-utilization of aircraft capacity. As was stated earlier, the domestic fleet in commercial service comprizes only two Herons with a capacity of 15 passengers each or two tons of freight. Total capacity may appear very small to meet the needs of the country, but demand is so low that at present only one Heron is in regular service. Even the single plane is not utilized to full capacity. In the 1964/65 period when S.L.A. actually made a profit, only 60-70% of plane capacity was utilized on average. When one considers that the Heron is a fixed wing plane operating on very short routes with low traffic potential, the uneconomic nature of domestic air transportation in Sierra Leone is highlighted. Private communication with a senior official of S.L.A. did not give any impression that demand for internal air transportation is

likely to increase at all rapidly.

The Future

The foregoing discussion on under-utilization of capacity naturally leads to an inquiry as to the future of domestic air transportation. The first point deals with the carrier itself. The small and compact nature of Sierra Leone renders the use of fixed wing aircraft on short stage lengths where ground time is so important, rather problematic. The ideal commercial craft for such a situation would be a helicopter; but there is hardly any likelihood that helicopters will replace the Herons. In short, operating costs for the domestic service will continue to be high and demand for air transportation low. Only a heavy government subsidy would reduce air fares to a point within the economic reach of a large proportion of the population.

Secondly, the future of domestic air traffic does not give much promise. The present air route alignment closely follows the main surface communication arteries so that, when the present plan of a high speed road network is completed, road competition will be so intense that air transportation would be deprived of most of its traffic. Such a development is likely to occur on the Freetown-Bo-Kenema route. The government, for social, political and economic reasons, decided in 1962 to invest about Le 500,000 (£250,000) in the construction, improvement and extension of air strips all over the country. Such an investment represents about 19% of the total aviation programme.[7] Some of the areas scheduled for airstrips (Kailahun and Songo), are either too near existing airfields

(Kailahun is only 27 air miles from Daru and Songo is but 13 miles from Hastings), or lack any potential traffic as is the case with Moyamba. The former, if linked by air will normally produce the problem of a traffic shadow which will only further depress the financial position of the domestic air services. Although it is difficult to evaluate the economic potential of the recently opened Gbangbatoke airfield, with the rapid development of rutile and bauxite mining in the area, the need for the speedy movement of personnel and spare parts are sufficient justification especially with the poor surface communication of the area.

The area that offers the best potential for air services is that around Kabala. Several motives, including social and political, are strong points favouring such development, but the most important is the economic factor. Koinadugu District, though sparsely populated, constitues 16.5% of the area of Sierra Leone. The terrain does not yield easily to the development of land communications, hence the area is poorly linked with the rest of the country. There is no immediate plan to improve road accessibility to Kabala, for the government is more concerned with higher priority areas. To correct this communication imbalance and speed up the economic development of the area, air transportation should be established. The demand here is not for passenger services but for air freight traffic in frozen meat, if an abbatoir and refrigeration plant are constructed in Kabala. The town itself is the centre of a large animal industry supplying about 10,000 cattle every year to all parts of Sierra Leone. These cattle have to be driven on the hoof, causing a 10% loss in weight valued at

about £30,000. This loss alone, coupled with speedy distribution of meat would justify an airlift. A further load factor could be expected from perishable vegetables which can economically be cultivated in the ideal climate of Koinadugu District. Proper integration of the meat and fish industries will provide a useful and steady return load of fish to serve such northern urban centres as Makeni, Magburaka and Kabala. The introduction of air transportation in Koinadugu District could release the vast development potential of this isolated part of Sierra Leone.

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2. Reichman, S. "Domestic Air Transport in Sierra Leone", The Bulletin. The Journal of the Sierra Leone Geographical Assoc., IX (May, 1965), p. 27.

3. Ibid p. 27.

4. Ibid p. 27.

5. Transportation Consultants Inc. Transportation Survey of Sierra Leone, (Washington, 1963), p. 110.

6. The occupational groups in Table 9.4 represent the majority of the working population.

7. Transportation Consultants Inc. op. cit. p. 110.

CHAPTER 10

THE ECONOMIC AND SOCIAL ROLE OF TRANSPORT

The establishement of a transport network in a particular territorial unit usually sets in motion the performance of multiple functions by the various transport modes. The movement of commercial products and their internal and external distribution become feasible,[1] manufactured goods are imported from abroad, industry tends to develop at nodal points and the mobility of persons both for business and pleasure, is accelerated. Besides the intensification of economic exchange, transport furthers the establishment of urban centres and the advance of rural areas. The value of land along a routeway usually increases and a concentration of population close to the highways often takes place. Transport provides gainful employment for a sizeable part of the working population and has a tremendous strategic significance and administrative utility, both in time of war and peace. This is best exemplified by the role of the rail and road services in the movement of military personnel and equipment, and the speedy movement of food supplies to the troops during the Second World War. Further, the use of the Freetown harbour as a British naval base where over 250 ships gathered at one time, is a significant case in point.

Transport and Trade

A basic economic objective in the establishment of the transport system during the colonial period, was the creation of an economy exporting raw materials to the industries of the metropolitan country, and importing

that country's manufactured goods. The initial commodity flow pattern was thus overwhelmingly based on the outward flow of raw materials and the inward flow of manufactured goods. The traffic pattern consisted of primary products moving by feeder roads to the nearest railhead and then proceeding by rail or water direct to the ocean terminals for export. Export commodities were the outstanding feature in bulk transport and were deliberately encouraged, especially in the case of palm kernels, by the railway's policy of differential rates. Export traffic was thus made as economic as possible while imported goods were taxed to the utmost. This was the pattern of early international trade and, even today, the structure of rail freight rates still reflects a disguised subsidy for export produce.

It is extremely difficult to quantify precisely the magnitude and importance of the work that has been accomplished by the transport system; perhaps a useful approach is to view it in terms of the total value of trade which is handled by the various modes. This approach however has its limitations in that trade statistics only give export and import figures; there is scarcely any information on internal commerce. Hence one has to assess the value of the transport services mainly from the point of view of foreign trade (Figures for 1920-1959 in Table 10.1 represent 5-year averages) and supplement this by the output of the services which amounted to Le 16.3 million in 1964. Roads accounted for Le 9.7 million, the government railway (S.L.G.R.) Le 1.9 million and water transport Le 3.0 million.[2]

TABLE 10.1 INTERNATIONAL TRADE 1920-1965 (in '000 Leones)[3]

Year	Imports	Exports
1920	6546	4500
1924	3795	2888
1929	3580	3100
1934	2056	16520
1939	2748	4444
1944	8036	2732
1949	9218	6844
1954	19682	19880
1959	46352	28000
1960	52684	53262
1961	65078	58736
1962	60972	41150
1963	59710	57886
1964	71019	67965
1965	76875	63224

Source: Annual Trade Reports

Another way of sizing up the amount of work done by the transport services would be to determine the total tonnage of freight moved. Here again the records give only a partial picture; no reliable statistics are available on the volume of freight transported by private motor carriers and inland water craft, although the former provide today the most important transport mode in the country. Table 10.2 is an attempt to present a crude estimate of the total tonnage hauled by the transport services.

TABLE 10.2 FREIGHT MOVEMENT 1960-1965 (in Tons)

Year	Port	Airways	Railways	Roads	Inland Waterways
1960	2,276,000	129	1,652,560	607,277	1,555,723
1961	1,912,000	163	1,869,359	662,541	1,773,459
1962	2,738,000	242	2,103,307	615,169	1,999,831
1963	2,799,000	364	2,055,688	748,252	1,988,748
1964	2,956,000	513	2,122,549	948,239	2,182,761
1965	3,127,000	547	2,328,918	957,473	2,451,527

Sources: Sierra Leone Port Authority
Sierra Leone Airways (unpublished data)
Sierra Leone Produce Marketing Board (unpublished data)

The figures quoted in Table 10.2 require some explanation to clarify the apparent conflict as to the relative significance of the various services. Primarily, the figures relate to both the national and international traffic, thus the importance of road haulage is inevitably minimized. In this respect, ports, railways and inland waterways handle the greatest volume of freight, while road and air services are minor carriers. The dominance of the former modes emphasize the colonial nature of the economy; for the bulk of movements consists of raw materials and imported manufactured goods. In 1965, a breakdown of total freight revealed the following

composition: 2,265,000 tons of iron ore, 13,527 tons of agricultural produce, 173,000 tons of bauxite and 658,000 tons of imported goods.

Part played by various Transport Services

Ports It may be observed from Table 10.2 that ports invariably bear the greatest freight load which amounted to 36% of all freight handled in 1965. The ports cater mainly for international sea-borne traffic. In terms of volume, the specialized mineral port of Pepel is most important for it now handles an annual average of over 2,000,000 tons, leaving the rest of the ports to handle an annual average of about 1,000,000 tons. It is further interesting to note that the two mineral ports, Pepel and Niti, together handle about 70% of total port traffic. The general ports of Freetown and Bonthe together account for 30% of port tonnage; the contribution of Bonthe is insignificant since it loaded only 11,000 tons of export freight and no imports in 1965. Freetown, despite its comparatively small tonnage, is nevertheless the most important port since it handles over 60% by value of the nation's total external trade.[3] Freetown deals with the bulk of agricultural exports, a dominance which has been encouraged by the S.L.P.M.B.'s channeling of all such traffic to Freetown, just as the Marketing Boards of Nigeria direct all agricultural export traffic to the ports of the Niger Delta.[4] Despite its great significance to the nation, the port has always been subject to congestion; in 1954 the first major remedy was achieved by the completion of the Queen Elizabeth deep water quay, with 3 berths capable of taking 2 large ships and one small one. These were considered adequate to solve the growing congestion at Government wharf which the new port replaced. However,

increasing trade and the growing number of ships quickly exposed the inadequacy of the new port, and at the moment a westward extension across Fourah Bay is being constructed to create berthing facilities for 4 more ships.

Railways. Although often treated as a transport relic, there is no doubt that the S.L.G.R. played the most important pioneer role in the social and economic development of the country, while the DELCO mineral railway was significant mainly in the development of the Marampa iron-ore mine. The two lines differ basically in that the S.L.G.R. is rapidly declining due to increasing road competition, while traffic on the mineral railway is expanding and is not subject to road competition. In 1965 the DELCO line carried 97.3% of all rail traffic, while the S.L.G.R. carried only 2.7% or 63,918 tons. However the S.L.G.R. is still of some importance to the national economy in that, being a public common carrier, it bears the burden of distributing bulky imported goods and also collecting a substantial proportion of cash crops, as seen in Table 10.3

TABLE 10.3 FREIGHT MOVEMENT (S.L.G.R.) 1960-1965 in Tons

Year	Up Traffic (Imports)	Growth Index	Down Traffic (Exports)	Growth Index
1960	75,649	100.0	36,911	100.0
1961	79,313	104.8	32,046	86.8
1962	90,199	119.2	30,108	81.5
1963	69,147	91.4	32,541	88.8
1964	56,493	74.7	25,051	67.8
1965	42,821	56.6	21,097	57.1

Sources: Quaterly Statistical Bulletins.
Annual Reports of Sierra Leone Government Railway.

This clearly shows that over 60% of rail freight consisted of imports, indicating a radical change from the railway's traditional function as a predominant export carrier. The bulk of the traffic is concentrated on the main line running from Freetown to Pendembu, the branch line from Bauya to Makeni carries an insigificent proportion because the area served is generally less-productive, and also experiences intense road competition. Hence it contributes only 5% of total S.L.G.R. traffic.[5]

Inland waterways. The movement of freight on the inland waterways is most important in the export sector of the economy and plays only a minor role in internal commerce. Its significance is most felt in areas either not served by rail or poorly served by roads. The bulk of the movement consists of primary products such as iron ore, bauxite, piassava and palm

kernels which make inland waterways an intrinsic part of heavy transport facilities. Despite the continuing increase in tonnage carried, the relative importance of water transport is far less than it was in the mid 19th century. This loss can be attributed to the industry's inability to modernize quickly so as to be competitive, and the consequent diversion of traffic to rail and road transport. Today its importance lies in the movement of mineral ores of which it carried 2,451,527 tons in 1965. Its contribution to the movement of internal trade goods is in the region of 100,000 tons. Such traffic is important in the Scarcies and Sierra Leone rivers, while iron ore is important in the Sierra Leone river and bauxite in the Sherbro river. Strictly speaking, iron ore cannot be classified as inland water traffic since it is loaded direct into ocean-going vessels and unlike bauxite, does not involve any further transhipment within territorial waters.

Road Transport. The road freight figures shown in Table 10.2 are neither truly representative of the magnitude of the services performed, nor do they portray the great significance of roads in internal commerce. There is no doubt that roads today provide the most efficient medium for the overall improvement of the economy. They play the most important role in the movement of agricultural exports and imported goods, in the distribution of the products of local industries and in the transport of local food-stuffs to urban centres. Furthermore, roads have become the biggest passenger carriers. Even in the mining sector of the economy, roads are fast becoming a crucial production factor since they provide bulk transport

for the haulage of bauxite and rutile from the mines to the mineral port of Niti. There is hardly any facet of the economy and society that is not touched by roads and road transport. It is therefore extremely regrettable that only meagre statistical information exists to show the activities of this private industry. That it has undergone tremendous expansion in the post war period, is reflected in the number of registered vehicles in circulation, and the rising trend in motor fuel consumption. In 1950 the total vehicle population, excluding agricultural and mining vehicles, was estimated at 500,[6] in 1966 it has soared to 12,000;[7] motor fuel consumption was only 1.5 million gallons[8] in 1950 but had risen to about 8 million gallons in 1966,[9] indicating that the present consumption rate averages 660 gallons per vehicle. This represents a high route mileage per year and an intense utilization of capital equipment.

Air Transport. Both the international and domestic air services have shown a rapid rate of expansion in the last 6 years. Though this expansion had chiefly in view the provision of regular and frequent passenger connections, the volume of cargo airlifted has also risen greatly. Table 10.4 helps to show the trend in air traffic.

TABLE 10.4 AIR TRAFFIC 1960-1966

	International Service		Domestic Service	
Year	Freight (Tons)	Passengers	Freight (Tons)	Passengers
1960	129	21,946	-	-
1961	163	25,945	-	-
1962	201	28,678	41.6	7,812
1963	285	27,224	79	8,152
1964	409	30,456	104	9,929
1965	446	31,819	101	9,572

Source: Quaterly Statistical Bulletin 1966.

It is significant to note that international traffic dominates the pattern while the recently established domestic service has shown an appreciable increase in freight tonnage carried, but in the passenger sector the increase has been small. This relatively low rate of increase in the passenger sector may be explained by the comparatively high charges and the short distances involved, which together, inhibit the extensive use of the services. Hence there is a considerable gap between the potential carrying capacity of the domestic service and the actual load carried. The under-utilisation of capacity is common in all the domestic routes which average a space utilization of only 60%. The problem of air transport is to secure enough traffic at existing rate levels.

Commodity Movement. The commodity flow pattern is still dominated by the outward movement of export freight and the inward movement of imported goods. The transport of minerals shows a clear cut division and there is no element of inter-modal competition. It is with export agricultural produce that inter-modal competition exists. Although the government railway virtually traverses the most productive agricultural areas, it carries only a small proportion of the produce. In 1965 it moved 5,338 tons of palm kernels out of a total export volume of 52,158 tons; 60% of this export tonnage was produced in rail-served areas and it could only capture 26% of the traffic available. Its role is more significant with coffee and cocoa, for in 1965 it carried over 50% of coffee exports and virtually monopolized the cocoa traffic. The interesting development here is that road transport has taken the greater proportion of export agricultrual traffic and the trend is likely to continue.

Manufactured goods, especially textiles, have always been pre-eminent in the inward flow of freight by rail, road and water. However, from 1965 onward, machinery and transport equipment necessary to implement development programmes, have exceeded all other categories by weight and value, and in 1965 their value represented 31.9% of total imports. Motor vehicles have in the main accounted for the great increase. Manufactured goods still contributed 27.5% by value of all cargo imported in 1965 while food products came third with 15.2%. These three categories exhibit the widest range of distribution by rail, road and water services. The movement of fuel and lubricants is restricted largely to road and rail

transport, but it is becoming increasingly apparent that roads are fast dominating this traffic.

It is extremely difficult to determine the extent of movement by mechanical transport means in internal commerce. Table 10.5 shows the number of persons utilizing particular transport media to convey locally produced foodstuffs to market. It further tries to relate type of transport with distance, expressing volume of traffic within each distance limit as a percentage of total movement for a particular mode. It must be stressed that the figures do not portray the tonnage of foodstuffs carried, they merely give the number of sellers participating in the trade. It is difficult to establish a direct relationship between number of persons and tonnage of foodstuffs carried, but it is most likely that the two would tend to vary proportionately.

TABLE 10.5 NUMBER OF PERSONS IN MOVEMENT OF FOODSTUFFS - 1966

Transport Mode	0-5 Miles	5-15 Miles	15-30 Miles	Over 30 Miles
Head Porterage	17,800	43,200	11,100	8,300
Water Craft	400	3,300	3,700	1,500
Train	200	100	-	-
Lorry	14,300	14,600	3,900	2,800
Bicycle	45	300	-	-
TOTAL	32,745	61,500	18,700	12,600

Source: Agricultural Statistical Survey of Sierra Leone 1965/66

A striking feature to note - and a characteristic of subsistence farming in developing countries - is the fact that the bulk of locally produced foodstuffs is either consumed within the area of production, or undergoes a very short journey to the nearest market. The volume of movement tends to decrease with distance from producing areas and head porterage is the dominant form of transport. Such movement is usually in small quantities and since the bulk of the produce is of low value, mechanical transport means often prove uneconomical. Hence head porterage accounted for 64% of all traffic and lorries came next with 28%. While the importance of these two transport modes is universal, water transport, though a substantial carrier, is of significance only in coastal areas especially with Bullom-Freetown traffic. Interior urban centres like Bo, Kenema, Koidu and Makeni are notably dependent on truck deliveries and head porterage from rural areas within a 20-mile radius, for daily supplies of perishable foodstuffs. The coastal city of Freetown relies to a greater extent on water and rail transport to bring in fresh produce.

The Movement of Persons

A general characteristic of passenger transport in Sierra Leone is that it strongly reflects the social stratification of the population. Ordinarily the type of services used is a function of the user's income and in a predominantly mercantile economy, personal incomes tend to vary with social and racial groups. Public rail and road transport are overwhelmingly patronized by the indigenous African population, which generally forms the lowest income group, while the greater proportion of

air passengers are Europeans, Americans and Lebanese. The rapid development of international air services has produced a striking augmentation in the number of occidental travellers entering and leaving the country by this mode, rather than through the regular maritime channels. The saving in time is a strong factor in the observed trend since it now takes only 6 hours to fly from London to Lungi airport by the new V.C.10 trans-continental plane, while the trip by sea from Liverpool to Freetown requires 9 days. Hence in 1965, 60% of all international air passengers were occidentals while for ocean travel, they constituted only 16% of the total compared with 83% for Africans. The Asian population which is composed of large-scale merchants, and by implication in the higher income group, repeat the occidental pattern of air travel. African travellers mainly engaged in small-scale trade along the West African coast, show a preference for sea travel, a feature which is due both to the nearness of their destination and their inability to meet the high charges involved in air transport.

Long distance migration of the African male worker and sometimes his wife, from the tribal community, to a place of employment has always been a conspicuous feature of the African social landscape. Such migrations usually have urban centres or mining areas as their destination. In the past, this voluntary displacement with the aim of securing wages was accomplished mainly on foot but, since the Second World War, mechanical transport means have increasingly effected the transfer of the nation's labour force. The mining labour force provides a good example since its

composition and origin reflect the interplay of the several factors in labour migration. It appears that proximity to a main motor road is a significant factor in the movement of workers. In the mining industry, a greater proportion of the labour force tends to come from settlements located on a motor road along which there is a regular stream of traffic. In certain instances, especially in diamond mining, it is observed that some workers do originate from settlements that are 20 miles removed from a motor road. Rural migration into urban centres especially into the Freetown urban area, is carried out largely by road transport, but in the interwar years, rail transport was more significant. Although most migrants end their journey by utilizing the services of some mechanical transport means, the journey from the tribal community is often started on foot. The cultural significance of migration is that it forms an important process in the diffusion of social and economic changes, as seen in the acquisition of new skills and habits.

Migration is also part of the economic development process, for the inherent structural change facilitates the shift of land and labour resources from subsistence to market oriented economies.[10] With labour it is reflected in the provision of wage employment, and the transport industries play an important part in providing such employment for a substantial proportion of the national working population. The transport services employed, according to the 1963 census, 16,170 workers divided among the various services as shown in Table 10.5.

TABLE 10.6 EMPLOYMENT IN TRANSPORT SERVICES 1963

Service	No. of Workers	Percentage
Road Transport	6657	41.2
Rail Transport	3064	18.9
Ocean Transport	2643	16.3
Inland Water Transport	1796	11.2
Airways & Storage	1088	6.7
Communications	922	5.7
TOTAL	16,170	100.0

Source: 1963 National Census Vol. I.

The figures do not really give a true comprehensive picture of the labour force engaged, this is much more so with road transport where the employment pattern exhibits extreme instability.[11]

Effect of Transport on Urban and Rural Development

The evolution of urban centres has been strongly influenced by the development of local transport. Around the mid 19th century, water transport produced a coastal urban pattern extending from Port Loko, an old Portuguese trading post,[12] in the north, to Bonthe on the Sherbro Island where English traders settled. The outstanding relationship between transport and urban development is provided by the capital city of Freetown

which in the 16th century, was an important watering place for ships and was visited by Sir John Hawkins in the 1560s[13] and by Drake in his journey round the world.[14] It gained renown as a major slave port and later as a settlement for freed negro slaves. Its real modern growth and development however, started in the last decade of the 19th century when it became the starting point of the government railway. At Wellington, then a nearby suburb, was located the railway camp where the construction crews assembled materials and made repairs to their equipment, before tackling the problem of pushing the railway to the interior. By 1910 the city was effectively linked with the Protectorate which became its economic hinterland, and trade expanded rapidly. Today the city is the hub of overland communications, industrial and commercial activities and has the largest cluster of people, about 128,000 in 1963.

The railway, more than any other transport medium, has helped in the development of towns along its track and at convenient distances away. It was the railway which gave to Bo, Kenema and Makeni their regional importance, and proximity to the railway further influenced the growth of such towns as Bumpe, Sembehun, Njala and Teiama. The 1963 national census revealed that on a population basis, 10 of the first 20 large towns in Sierra Leone were railway towns (Freetown, Bo, Kenema, Kissy, Makeni, Magburaka, Segbwema, Baoma, Blama and Wellington). Another 7 have depended largely on the railway for their growth, though this function is now being taken over by road transport. Wilberforce gained its importance as a dormitory settlement in the days of the Mountain railway (1903-1929),

Koidu, Jaiama, Yormandu and Peyima primarily owe their rapid development to the diamond boom of the 1950s, but such growth cannot be easily divorced from the invaluable services rendered by the railhead at Segbwema, which acted as a break of bulk point. Kailahun also depends to some extent on the services rendered by the railhead at Pendembu while Lunsar, the iron ore mining centre, is the product of both the mine and the private mineral railway of DELCO. Only two towns, Bonthe and Port Loko have not been influenced in any way by railway development. Hence the growth of 18 of the first 20 large towns is easily related in some way to the influence of rail transport.

It is further interesting to note that urban development consequent on transport innovation has brought along its trail the establishment of several essential services such as electricity, water supply, educational and medical facilities, postal services, banks etc. The coming of the road or rail track not only heralds the growth and expansion of the town, but also the provision of essential services for the welfare of the residents. This point is fully brought out in Sierra Leone in Maps.[15]

In summary we may note the following salient points. Firstly, there is a very strong correlation between the pattern of towns and communications. This is to be expected in a country where the growth of urbanism and the transport network have been primarily due to European colonization which acted as the central agency. The transport network has in general produced two types of settlement patterns: when roads and rails penetrate

an area that already has an established settlement pattern, it is usual for the penetration lines to sidetrack the "native" towns, resulting in the original settlement gravitating towards the new communication lines. This often leads to the development of twin settlements as seen in the case of old and new Yele. But when the transport lines precede the growth of towns, then the settlements are directly related to the rail and road network. This is particularly so in areas of recent and rapid economic and social development as in diamond mining areas, for example Ngaraniya (meaning road junction in Mende) and the incipient road town of Mile 47. Further, marketing centres tend to develop along rail routes and highways acting both as collecting and distributing points. This was the case in the growth of the rail heads of Ronietta and Yoyema.

Roads in particular often help to revitalize the economic and social situation of a town by providing an efficient link to facilitate internal commerce. On the other hand, decline in the dominant transport link serving an area usually leads to the stagnation of the area served, as seen in the decline of water transport and the consequent stagnation of Magbile, Sulima and Bonthe. Finally the ecological pattern of some large urban centres, especially in the evolution of C.B.D.'s, is largely a function of the dominant transport mode. In the heyday of rail transport, commercial activity was solidly concentrated in the immediate periphery of the railway station. With the decline of this transport facility and the phenomenal rise of road transport, commercial activity, in particular Lebanese/Syrian retail trade, has progressively gravitated towards the

lorry parks, which have today become the central foci of both intra-urban and inter-urban movements. The transport network has played a pervasive role in the development of the settlement pattern and at present, roads are increasingly active in modifying the internal structure of some large urban centres like Bo.

In rural areas there tends to be a definite relationship between the degree of accessibility and the level of commercialisation. Although urban centres do constitute the foci of transport services, and as such provide the major attractions for development, the presence of transport lines in rural locations has definitely attracted schools, health centres, the odd Lebanese trader and some African retail stores. Further, it helps the redistribution of population from less productive districts to areas where the principal economic crops can be cultivated with greater profit. Hence transport has been a powerful instrument in rural development, by allowing the expansion of cash agriculture, the greater diffusion of ideas and the material accomplishments of modern civilisation.

In conclusion, it is significant to evaluate the importance of roads. In the field of urban development, their contribution has been minimal compared to the railway but today, their impact on economic and social change is far more pervasive than the initial effects brought about by rail transport. The flexibility of roads facilitates the greater diffusion of social services and these are made more easily accessible to more people, while the horizon of cultural unity is extended and provincialism broken down. Even more, the presence of good roads tends to have a

profound effect on the location of industry, the exploitation and use of natural resources and the distribution of population. Roads can be very effective in checking growing rural migration to urban employment; they could be used to decentralize industrial development and create centres of growth in smaller towns and villages, so as to link the economy of rural areas with the growing requirements of neighbouring urban centres.

Roads by their nature can contribute tremendously towards the better diffusion of economic development, and in consolidating the whole agricultural foundation, without which, the much desired industrialization can hardly materialize in a developing country like Sierra Leone.

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CHAPTER 11

MOTOR VEHICLES AND ROAD TRANSPORT

A serious study of road transportation, especially when it is related to economic and social development, must consider the various uses to which the road network is being put. This involves the study of traffic characteristics, growth trends, traffic composition on the various classes of roads, and the type and volume of freight carried. It is also essential to know the regional distribution of vehicles and of such ancillary services as petrol stations (Fig. 11.1), as well as the type and ownership of vehicles and the rate of replacement. On the basis of these data, estimates of potential growth in road transportation can be made, and road construction and the provision of ancillary services can be geared to future demands.

Forecasting the growth of the number of vehicles is an important aspect of road development studies. Too often, roads have been planned and built in Sierra Leone with little attention to traffic potential. Such roads rapidly become obsolete as the volume and character of traffic changes. Accurate forecasts of future traffic are also of immense importance to such services as the importation and distribution of both vehicles and fuel. Importers and distributors, on the basis of such forecasts, can plan their investment and marketing activities to satisfy future demands.

Licensing and Classification of Vehicles

Official statistics on vehicle registration and licensing are provided by the Police Licensing Office in Freetown. Owing to the inadequacy of staff, some of the more interesting and complex data are not available from the police and the author has attempted to fill in the missing information.

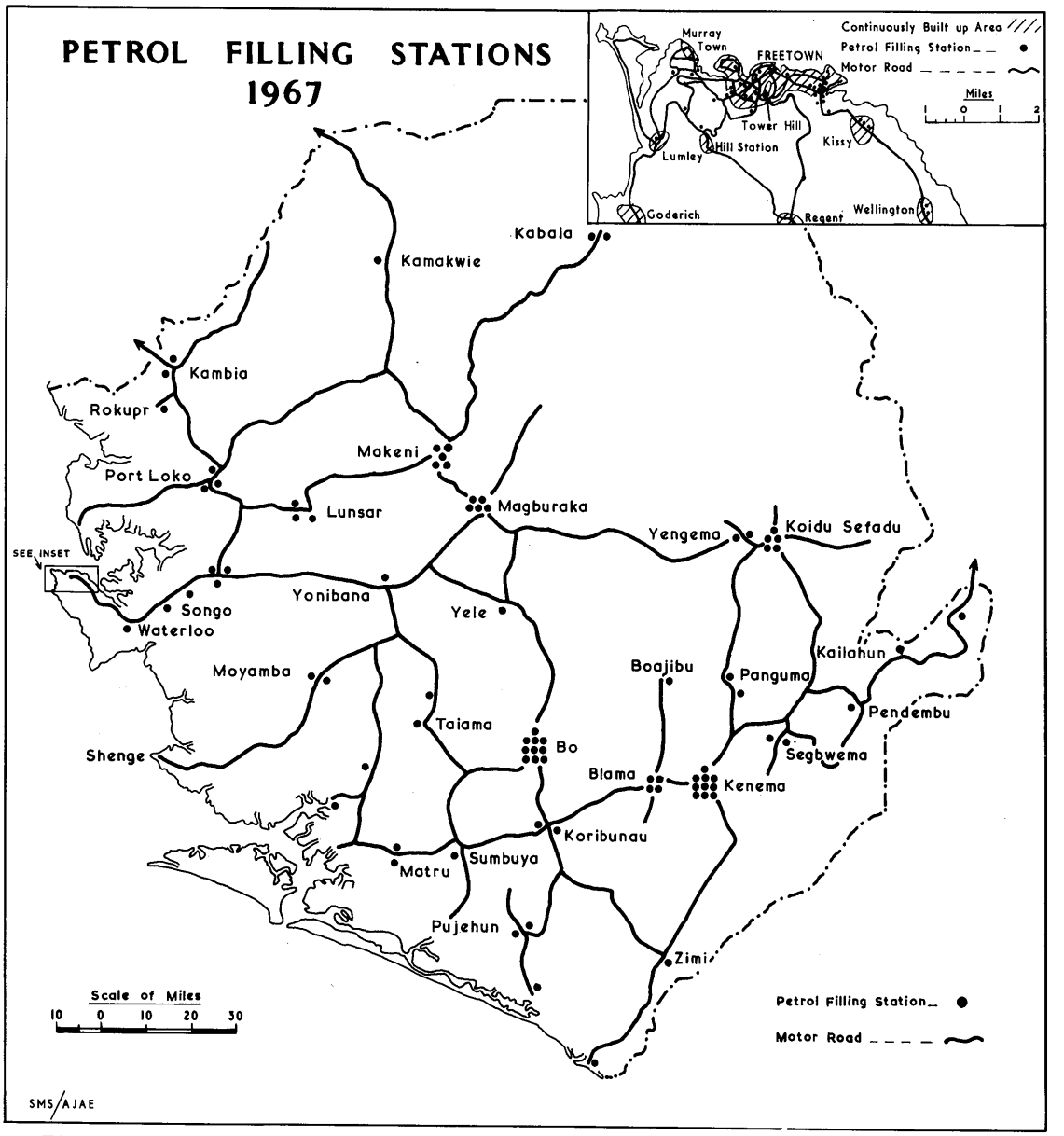

PETROL FILLING STATIONS
1967
Continuously Built up Area
Petrol Filling Station
Motor Road
Miles
0
2
Murray Town
FREETOWN
Tower Hill
Hill Station
Lumley
Kissy
Goderich
Regent
Wellington
Kabala
Kamakwie
Kambia
Rokupr
Port Loko
Makeni
Lunsar
Magburaka
Yengema
Koidu Sefadu
SEE INSET
Songo
Waterloo
Yonibana
Yele
Kailahun
Moyamba
Boajibu
Panguma
Pendembu
Taiama
Bo
Segbwema
Shenge
Blama
Kenema
Koribunau
Sumbuya
Matru
Pujehun
Zimi
Scale of Miles
10 0 10 20 30
Petrol Filling Station
Motor Road
SMS/AJAE

Fig.II.1.

The available data are as follows:

(i) Total number of licenses issued each year. This gives a reasonable estimate of the total vehicle population.

(ii) New registrations provide a precise count of the number of vehicles coming onto the roads for the first time. These consist almost entirely of new vehicles.

(iii) The types of Vehicles which are classified thus:

(a) Commercial vehicles: All trucks and lorries, buses, special purpose vehicles, and vans and trucks above 30 cwt.

(b) Cars: All saloon cars, taxis, and light vans and trucks 30 cwt. and below.

(c) Motor cycles, including motorized bicycles and motor scooters.

This classification does not give a wholly accurate picture of the actual uses to which vehicles are put. For example, taxis and light vans engaged in passenger transport are classified as "cars", which implies that they are "private" as distinct from "commercial" vehicles.

All vehicles, on initial registration, are given a number, the letter prefixes of which denote the area in which registration took place. Unfortunately, this does not result in an accurate picture of the regional distribution of vehicle ownership and operation. In particular, a considerably greater number of vehicles are registered in the Western Area than in fact operate in it. There are a variety of reasons for this situation. Almost all firms importing and distributing vehicles are found in Freetown. Furthermore, registration in the Western Area which has the highest proportion of tarmac

roads, gives a distinct advantage in the second-hand market, particularly in the case of private cars, which fetch appreciably higher prices if they have a Western Area numberplate.

Vehicle Type

The stock of vehicles is officially divided into two groups: private and commercial. The stock of such vehicles for the period 1950-1964 is shown in Table 11.1

TABLE 11.1 ANNUAL NUMBER OF VEHICLES 1950 - 1964

Year	Private		Commercial		Total	
	No.	% Increase	No.	% Increase	No.	% Increase
1950	936	-	444	-	1380	-
1951	1044	11.5	426	4.1	1470	6.5
1952	1258	20.5	960	125.3	2218	50.9
1953	1709	35.9	965	0.5	2674	20.6
1954	1928	12.8	1421	47.2	3349	25.2
1955	2805	45.5	2126	49.6	4931	47.2
1956	2979	6.2	1835	13.7	4814	2.4
1957	3960	32.9	2308	25.8	6268	30.2
1958	5156	30.2	2400	4.0	7556	20.5
1959	5338	3.5	3444	43.5	8782	16.2
1960	5338	0.0	3664	6.4	9002	2.5
1961	6461	21.0	5077	38.6	11538	28.1
1962	7909	22.4	5098	0.4	13007	12.7
1963	8420	6.5	5280	3.5	13700	5.3
1964	9325	10.7	5425	2.7	14750	7.7

Sources: Davies, E. Roads and Road Transportat in Sierra Leone.
Police Licensing Office, Freetown.

The average annual increase in the number of private vehicles for the period 1950-64 was 18.4%, a rate of growth similar to that experienced in many other West African countries in recent times (Nigeria, 1953-59, 15% p.a.). The economic and social situation in Sierra Leone indicates that, with rising living standards, motor vehicle registrations, particularly those of private cars, will continue to increase. The following factors are considered important in influencing the demand for cars.

Primarily the consumer's income is a crucial factor in this demand. In Sierra Leone, there is at present little information available from which to relate car ownership to annual income. However, taking Le 1,200 (£600)[2] as the minimum income necessary to own and operate a car (although lower incomes have been encountered), a tentative correlation can be established between the increase of such incomes and new car registrations. Without doubt, future demand will be influenced both by the general level of incomes and by unpredictable changes in the patterns of income distribution.

Political independence, apart from bringing an immediate 22.3% increase in the total car population from 6461 (1961) to 7909 (1962), also induced dynamic forces that are influencing total car demand. The upsurge in the number of civil servants and technicians stimulated the demand for cars; since very few people entering posts which entitled them to a motor vehicle, failed to utilize the privilege of the government car loan scheme. Similarly, growing foreign investment in the country is creating an increase in managerial, technical and supervisory staff who are potential car owners. Further the recent university plan, as outlined

by the Principal, aims at producing at least 230 graduates every year by the end of 1973, and these graduates can be expected to become potential car owners.[3]

The price factor is another important influence in car sales. The system of motor vehicle loans to employees reduces the effect of price competition and sets a limit to downward price movements for private cars in the market. Whilst import duty raises the price of a vehicle to the purchaser, it is probable that for most cars the price elasticity of demand is low. An increase on car import duty is usually reflected by a similar increase in the retail price of cars, but demand does not decrease proportionately. Car loans offered to employees at marginal interest rates spread repayment over a number of years, and thus allow them to buy cars with reduced financial strain. However, in order to increase car sales, one is of the opinion that, instead of the present limited car loan system, hire purchase facilities should be made available to a larger proportion of the population especially on the private sector. The new terms will surely be relatively more onerous, but this is understandable because the extension of the scheme will involve greater financial risks. The finance houses and motor distributors can then widen the scope of their hire purchase business to include not only commercial vehicles as is the case now, but also private cars.

Having considered qualitatively the main factors influencing demand for private cars, it will be difficult to postulate that the 17.9% annual rate of increase experienced between 1950-64 can be maintained. This was a

period characterized by certain boom features in the national economy; for example, the illicit diamond trafficking of the 1950's with its concomitant expenditure on prestige goods like cars, establishment of parliamentary institutions, public corporations and embassies - factors which produced very high percentage rates of increase in some years. Estimating that the highest rate of increase for the future would be a continuation of the past 17.9% per annum, which is clearly impossible, the most likely future rate would be one based on the average rate for the last five years which comes to about 12%. A projection of the 12% rate of increase gives the following estimate of the "private vehicle" population.

TABLE 11.2 PROJECTION OF 12% ANNUAL RATE OF INCREASE

Year	No. of Private Vehicles
1966	10,440
1968	11,690
1970	13,090
1972	14,660

There has also been a big increase in the commercial vehicle population since 1950. The average annual rate of increase has been 19.6%, although variations in growth rates for various vehicles has been quite significant. The Bedford group has shown the fastest rate of increase and also constitues the largest proportion of all commercial vehicles over the years; accounting for 18.2% in 1964. Another trend is that prior to 1960, most commercial

vehicles were medium-sized lorries; the 1960's, however, are experiencing the introduction of heavy seven-ton lorries, like the Japanese Toyota. Nothing can be more unrepresentative now than to equate lorries alone with commercial vehicles; improvement in the road transport industry has introduced many specialized vehicles like buses, to ensure an appreciable degree of comfortable travel.

All indications point to the rapid growth of commercial vehicles. Present industrial development will intensify the demand for short distance road hauls for the movement of raw materials and finished products, and for the commuting labour force. It is also significant to note that the structure of the economy is one based on minerals and a variety of agricultural produce from small-scale scattered farms. Road transport is particularly vital in the movement of such produce; though it is not so important for minerals except for bauxite and rutile. If agricultural production should increase, as the government plans, then the demand on road transport will increase to meet the needs of both the domestic and export markets. The present slowness and technical inefficiency of the government railway will render it incapable of serving the needs of a rapidly expanding economy.

Imports are redistributed in small quantities to a widely scattered population. In 1963, out of a total population of 2.18 million, only 0.6 million lived in settlements of over 1,000 inhabitants. The rest lived in small rural settlements which, though relatively self-supporting in the production of some foodstuffs, depended on road transport to bring in

imported consumer goods. In the diamond mining areas, not only consumer goods, but also the bulk of rice and palm oil has to be brought in by road. With increased urban development and rising town populations, an increase in movement of foodstuffs and people must be expected.

Total Number of Vehicles

The stock of vehicles in Sierra Leone has shown a high rate of growth in the post-war period. This is illustrated in Fig. 11.2 which gives the number of vehicles licensed each year from 1950-1964. The graph is plotted on a logarithmic scale so that rates of growth can be compared visually, since lines of the same slope show the same rate of growth regardless of the units of measurement. On the same chart are indicated changes in the Gross National Product and Domestic Exports expressed in money terms.

Comparison of the slopes of the various graphs will show that vehicles have grown at a faster rate than either Gross National Product or Domestic Exports. As previous sections have shown, the rate of growth of the two vehicle types, private and commercial, was high although not very constant. Private vehicles, which at any time constituted more than 50% of all vehicles and often a far larger proportion, have exhibited the most constant rate of growth. The highest rate of growth was in 1952, when the total vehicle population increased by 51% in one year, while the total number of commercial vehicles increased by no less than 125.3%. This possibly reflects the normalization of trade in the early post-war period. On the whole, the high vehicle growth rates of the mid-1950's can be explained largely in terms of the trade boom precipitated and maintained by illicit

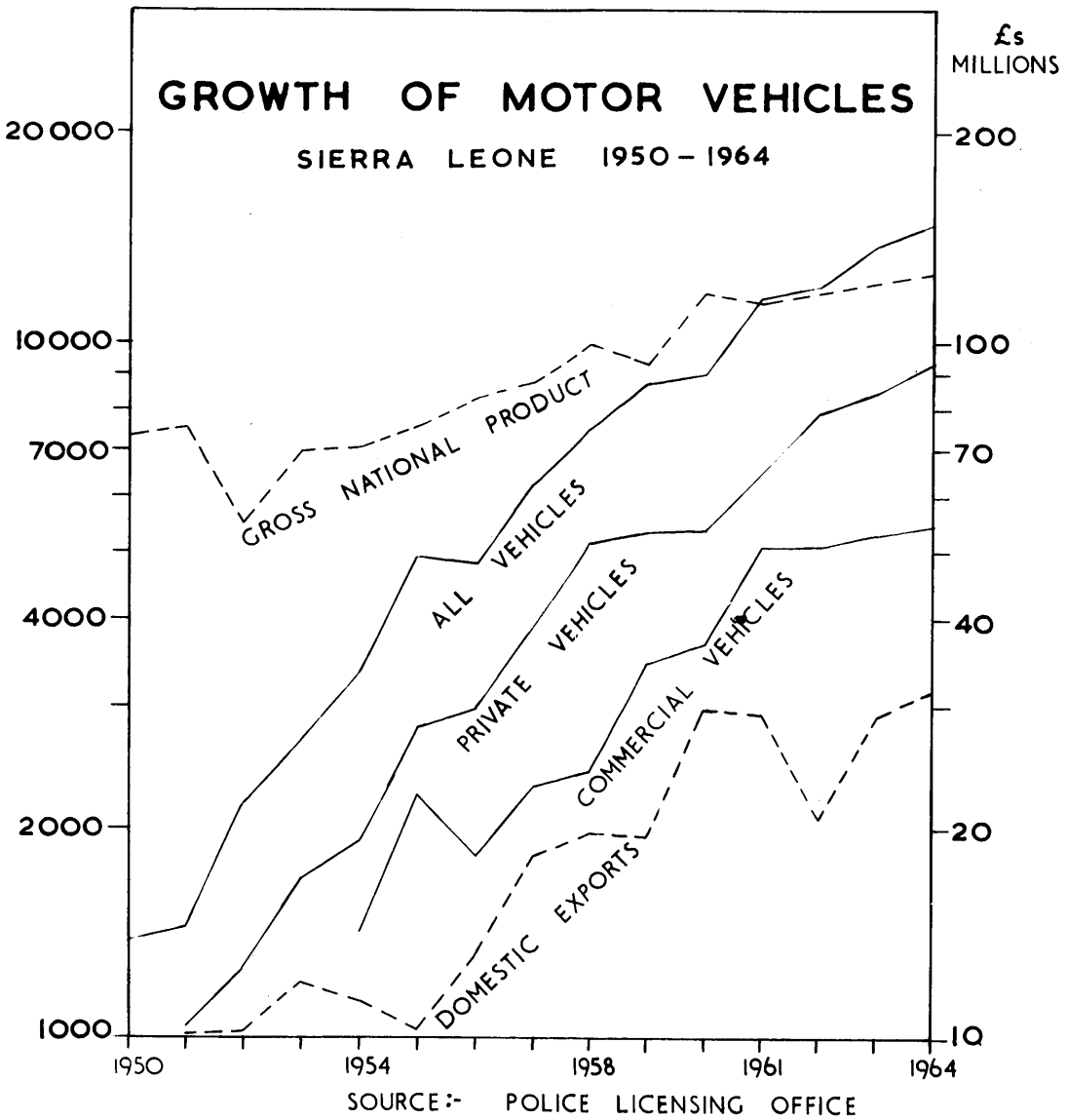

GROWTH OF MOTOR VEHICLES
SIERRA LEONE 1950 – 1964
£s MILLIONS
20000
10000
7000
4000
2000
1000
200
100
70
40
20
10
GROSS NATIONAL PRODUCT
ALL VEHICLES
PRIVATE VEHICLES
COMMERCIAL VEHICLES
DOMESTIC EXPORTS
1950
1954
1958
1961
1964
SOURCE:- POLICE LICENSING OFFICE

Fig. 11. 2.

SMS

diamond trafficking. In 1961 a 28.1% increase was registered for all vehicles in the first year of independence. In contrast, 1962 saw an increase of only 12.7% and 1963 only 5.3%, indicating that the boom effect of independence was short-lived.

These rates of growth are all remarkably high, and are unlikely to be maintained in future years. To project the average 18.4% growth rate of 1950-64 would give a total of 56,960 vehicles by 1972. It is highly improbable, in the light of other growth factors, that Sierra Leone could support such a large stock of vehicles by the date indicated. If reliable data on per capita income were available, a more reliable estimate of future vehicle numbers could have been made. Hawkins, in his work on Uganda,[4] showed the relationship between per capita income and population per vehicle licensed. He concluded that a high per capita income is usually associated with a high vehicle/population ratio, indicated by a relatively small number of persons per vehicle. Projecting the 1963 census population to 1972 at an estimated growth rate of 2.5% per annum, and the 1964 vehicle population at 18.4% per annum, would give 40 persons per vehicle in 1972 as against 150 in 1964. This is most unlikely, and a vehicle growth rate of between 9 and 10% per annum is therefore suggested as a more realistic figure. This would give a total of not more than 31,590 vehicles in 1972 and a ratio of 81 persons per vehicle.

Motor Vehicle Ownership

Owing to the nature of the records in the Police Licensing Office, it is difficult to support statements on this aspect with adequate quantitative evidence. Consequently some reliance has been placed on

evidence supported by past studies and by sample surveys. It is hoped that the results are fairly representative of the actual pattern. A major reason for the inclusion of this topic is the possibility of establishing a correlation between the proportion of motor vehicles owned by various groups, and the part played by these groups in the national economy.

As can be seen from Table 11.3, Africans are the most important group in terms of total numbers. Their predominance applies in practically all types of vehicles and is most marked in the case of commercial vehicles. The only exception is in specialized types, such as vehicles used in the mining industry and agricultural vehicles, most of which are owned by government and by companies. The European proportion appears to be larger than that of Asians, but in reality this is not the case, since it is a common practice for Asians to register their small commercial establishments as companies, thus swelling the totals under the latter head. A sample survey suggests that of the 2,032 vehicles registered as belonging to companies, over 1,000 are in fact owned bysmall Asian family concerns. The proportion owned by government appears large, but this includes all vehicles operated by statutory corporations, educational institutions and local government bodies.

Several forces, economic, social and governmental, have operated to produce the present pattern of ownership, and this section attempts to indicate the importance of these forces. Some valuable data on past changes are available from Cox-George[5] though unfortunately his classification lacks detail.

TABLE 11.3 VEHICLE OWNERSHIP BY GROUPS - 1964

Group	Private		Commercial		All Vehicles	
	No.	%	No.	%	No.	%
Africans	4196	45	3255	60	7451	50
Asians[1]	1865	20	542	10	2407	16
Companies[2]	839	9	1193	22	2032	14
Europeans[3]	1399	15	54	1	1453	10
Government[4]	653	7	381	7	1034	7
Religious Missions	187	2	-	-	187	1
Embassies	186	2	-	-	186	1

1. "Asians" include Lebanese, Syrians, Arabs, Indians, Pakistanis.
2. "Companies" include Lebanese limited companies.
3. "Europeans" include North Americans.
4. "Government" includes statutory corporations etc.

Attention here is concentrated on commercial vehicles since private car ownership, being influenced by its prestige value, is often a poor indication of economic standing. The African share of total car ownership has certainly been increasing, but it is difficult to correlate this with any specific economic trend save the general rise in incomes, and greater opportunities for employment, which have created more favourable conditions for African car ownership. The dominant role played by Africans in the

field of commercial transport does not conform to the Africans' share in other aspects of the country's commercial activity. As regards the general trading position of the three main groups, Europeans are predominant, Asians come second and Africans a relatively poor third. In the export and import sectors of the economy, European commercial firms hold virtual monopolies in a number of fields, outside these, Asians again come second and Africans last. In the field of retail trade, Asians have outcompeted the European concerns, which now confine their attention mainly to the larger urban centres, and the Africans' share is very small.

There are a number of reasons for the Africans' predominance in the sphere of commercial transport. Despite its use of complicated capital equipment, the industry is a relatively simple one in which to participate. As the driver is often also the vehicle owner, he can easily accumulate profit. Furthermore, government action has made road transport a near monopoly for the African: only he can operate "goods and passenger vehicles" or own "poda-podas" or taxis. Europeans and Asians can own commercial vehicles, but their use is largely restricted to carrying the owner's goods. European and Asian firms are now realizing that to operate their own vehicles is uneconomic, and are coming to rely more and more on the African operator. Conversely, the African, controlling only a small proportion of total trade, depends for patronage to a large extent on the European firms and, on a smaller scale, on Asian firms and the Sierra Leone Produce Marketing Board.

The future of the commercial transport industry points to a further continuation of the present trend. Government effort is largely directed towards giving the African, especially the Sierra Leonean, a greater share of the country's trade. In April 1965, a bill was passed restricting entry into the retail trade sector to Sierra Leoneans only. The long-term effect of this will be the ideal economic situation where Africans will own the greatest share of retail trade, and of the transport mode to run this trade. The share of the European and Asian groups will inevitably decline futher. It is still doubtful, however, whether the increasing African share of road transport business, will ultimately lead to a consolidation of the present small-scale operational units into large firms. There is no indication, at the time of writing, of any such trend. It is highly desirable, but one doubts if the chronic individualism which characterizes the business, will yield easily to some form of corporate organization without government intervention. It is perhaps here that government must act with an all embracing plan in mind. It is not just a matter of giving the African the monopoly of transport; such a monopoly must be directed to provide not only efficient service but also economic operation. The surest way of achieving this, is to consolidate the small transport firms into large corporate concerns, so as to derive the benefits inherent in the operation of economies of scale.

Geographical Distribution

Apart from a possible over-emphasis of the predominance of the Western Area, Table 11.4 may be taken as a fair indication of the regional distribution of vehicles.

TABLE 11.4 REGIONAL DISTRIBUTION OF MOTOR VEHICLES 1960-1964

Year	Western Area		Eastern Province		Southern Province		Northern Province	
	No.	%	No.	%	No.	%	No.	%
1960	4,473	55.7	1,527	19.0	1,345	16.7	687	8.6
1961	6,459	62.3	1,803	18.5	1,416	11.9	730	7.3
1962	7,234	67.1	1,700	15.8	1,224	11.4	610	5.7
1963	7,389	59.3	2,466	19.8	1,663	13.3	941	7.6
1964	8,176	55.4	2,758	18.7	2,350	15.9	1,466	10.0

Source: Police Licensing Office

Sierra Leone being a small country, implies that a vehicle's area of operation is by no means confined to the region in which it is registered or licensed. It may be assumed, on the other hand, that it is operated most

frequently within that region. The most striking feature is the concentration of more than half the country's motor vehicles in the Western Area, which contains only 8.9% of the country's population and covers only 0.8% of its area. This great predominance is particularly marked in the case of cars and vans, less so in that of lorries and buses. It is mainly the need to move cash crops and distribute imports which create a demand for road transport. Of the three possible transport modes, water, rail and road, the first two are in rapid decline, to the benefit of the road transport industry. The Eastern Province is the most important cash crop producer, followed in turn by the south and north, the last being concerned almost entirely with palm kernels. These differences do much to explain the fact that the Northern Province, with over 40% of the population and 50% of the area of Sierra Leone, has only 10% of the country's motor vehicles, while the Eastern and Southern Provinces combined have 50% of the population, 49% of the area and about 34% of the vehicles.

The last factor, demand for imported goods, has some influence on all regions. A very large proportion of imported goods is moved by road, even to areas where rail transport is available, since the latter is excessively slow. The region with the largest volume of retail trade may be expected to have the largest number of commercial vehicles, and this factor again places the Western Area first, the Southern and Eastern Provinces second and the North a very poor third.

Other factors could be advanced to explain the regional distribution of vehicles, but those already mentioned are by far the most important. The future appears likely to see a diminution in the preponderance of the Western Area. With the establishment of further areas of plantation crops and the growth of bauxite and rutile mining, the demand for commercial vehicles is bound to increase in the east and south. The rising level of incomes in the east, due mainly to diamond mining, seems likely to cause a fairly rapid growth in the demand for private cars. In the north, however, rapid growth remains unlikely and this half of the country may well experience a decline in its vehicle population, at least as a proportion of the national total.

The Origins and Types of Vehicles

The types of vehicle used in Sierra Leone reflect the international trading patterns of the country. In the past, trade was very largely with Britain and almost all motor vehicles came from that source. However, the "open door" trading policy adopted since independence has resulted in a diversification of vehicles operated in Sierra Leone (Table 11.5).

As can be seen in Table 11.5, variety of make is much more pronounced in the case of cars (private vehicles) than in that of commercial vehicles, and this has become more marked since 1960. In 1947, 90.5% of all cars imported into Sierra Leone came from the United Kingdom. By 1964, this proportion had fallen to 35.7%. West Germany, France, Italy, Sweden, Japan and Czechoslovakia are now making significant contributions to the total.

TABLE 11.5 VEHICLE IMPORTS BY COUNTRY OF ORIGIN

	1947		1960		1964	
	Private	Commercial	Private	Commercial	Private	Commercia
United Kingdom	326	265	342	642	418	537
Western Germany	-	-	264	35	281	31
France	1	-	175	37	300	121
Italy	-	-	116	-	30	-
Others	4	95	15	10	204	54
	331	350	912	742	1170	771

Sources: Annual Trade Reports
Customs and Excise Department

Small and medium-sized cars constitute more than 80% of the total, and in this group the Volkswagen is the most popular single make. Among the relatively small number of large "prestige" cars, the Mercedes-Benz is the most important. In 1964, no fewer than 60 different makes of car were imported 26 British, 26 other Europeans, 4 American and 4 Japanese. Of the 9 makes which constituted the bulk of these imports, 4 were British, 2 German, 2 French and one Italian.

A variety of factors account for these patterns. The type of car purchased bears a great relationship to the income of the buyer, and it is the wealthier element which usually prefers the large, expensive car with its implication of social prestige. In this group are to be found top civil servants, government ministers and many of the non-African foreigners such as Lebanese traders and diamond dealers. Among lower income earners in the car buying range, the factor of costs usually outweighs that of prestige, and there is a preference for the smaller and cheaper car. However, it is not uncommon to find members of the lower income group running a big car which has been obtained cheaply in the second-hand market. The demands of the taxi industry are also very important. Peugeot and Renault cars dominate the industry and this is the main reason for the large import of French cars. The Renault has the advantage of cheapness combined with four-door construction, an essential prequisite for a taxi. The Peugeot, on the other hand, is expensive, running and maintenance costs are high and its average life as a taxi is only about two years. However, the Peugeot distributors were the first to offer favourable hire purchase terms and this factor, combined with the large carrying capacity of the vehicle, account for its dominance in the taxi industry.

The geographical distribution of car types is primarily a function of road quality, and this limits the range of types which can successfully operate in the provinces without undue maintenance costs. Thus the Western Area, with its superior roads, has the full range of cars, but in the provinces there is a premium on cars which are versatile, compact, reliable

and have a good road clearance. The ubiquitous Volkswagen, the luxurious yet tough Mercedes-Benz and the versatile Landrover, thus make up the great majority of cars operating in the provinces. Among commercial vehicles, the range of types is smaller and British lorries, particularly the Bedford, continue to be dominant. Among vans, the French Citroen is the most popular, particularly for passenger transport. The Leyland group have supplied most of the government-operated buses in the past, but this function is now being taken over by Fiat of Italy. The introduction, in 1964, of the Japanese Toyota diesel lorry is now providing a challenge to the dominance of the Bedford. A factor here has been the removal of the preferential tariff formerly allowed on British vehicles.

Dieselization

A recent trend, confined so far to commercial vehicles, has been the greater use of diesel-powered types. It appears that about 30% of the new commercial vehicles registered between January 1964 and March 1965 had diesel engines. This factor is of considerable significance in estimating future trends in fuel consumption and thus, in revenue from taxes on fuel.

As has already been pointed out, road transport now plays the leading role in the movement of both goods and passengers. The bulk of the road transport industry is in the hands of numerous small-scale African owners operating at very high costs. There is thus the need to minimize the costs and one way of achieving this, apart from overloading or under-maintaining the vehicle, is by the use of the more efficient diesel-powered vehicles. Although the purchase price is usually high, this is offset by a longer working life, lower running costs and thus a greater potential earning

capacity. Despite its technical and economic superiority, however, the diesel engine has certain inherent disadvantages which tend to limit its popularity. The extreme scarcity of servicing facilities, especially outside the major towns, and the fact that the average driver lacks the technical skill necessary for running repairs to a diesel engine, account for the reluctance of many owners to make the change. As servicing facilities improve, however, and as manufacturers increasingly concentrate on the production of diesel-powered vehicles, the latter will become increasingly important among the heavier commercial types. This development is already foreshadowed by the growing popularity of the Toyota seven-ton diesel lorry.

REFERENCES AND NOTES

1. Since the 1965 and 1966 vehicle totals have not yet been released, Mr. R. Martinez of ITALCONSULT and the author, carried out a detailed breakdown of the national vehicle population for 1965 and the details appear in appendix A.

2. The figure Le 1,200 ($600) represents the mean per capita income that qualifies a civil servant to be entitled to a car loan.

3. Daily Mail Freetown. March 18, 1965 p. 1.

4. Hawkins, E.K. Roads and Road Transport in an underdeveloped country: A Case Study of Uganda. (London: HMSO 1962), pp. 31-32. Colonial Research Studies No. 32.

5. Cox-George, N.A. Report on African Participation in the Commerce of Sierra Leone. (Freetown: Govt. Printer, 1960), pp. 32-34.

CHAPTER 12

THE PATTERN OF TRAFFIC

Historical Sketch

During the 19th century colonization of Sierra Leone, the movement of freight and people depended mainly on water transport and human porterage. The transport system was then characterized by a proliferation of small ports and trading posts in and around the coastal areas. There was little lateral interconnection and each port had an extremely limited hinterland. The volume of traffic was then very low and consisted mainly of the down-stream movement of agricultural produce, and the up-stream movement of manufactured goods. The opening of the Sierra Leone Railway provided the first major phase in the evolution of a modern transportation system and formed the main penetration line from the sea coast to the interior. The introduction of the railway, though not a direct response to increasing traffic, provided a cheaper and more reliable transport mode for the economic exploitation of the country's natural resources. Added to this was the construction, in the first decade of the 20th century, of a feeder road system conceived as ancillary to the railway, and giving restricted access from railheads to the interior. In this formative period, the entire transport system was in its barest skeleton form, and the paucity of efficient through routes linking producing regions and exporting ports, or connecting large settlements with an appreciable potential for generating traffic, was reflected in the low level of traffic.

The development of the various transport modes set in motion a series of spatial processes and readjustments as the relative locational advantages

of all centres changed. First in the series was the decline in numbers and function of a vast majority of the small ports, and the concentration of traffic on ports at the termini of the earliest penetration lines. Such a process enhanced the early dominance of the port of Freetown and enlarged its hinterland at the expense of smaller ports like Magbile and Sulima, whose geographical location rendered them unsuitable to meet the demands of an expanding external and internal commerce. The decrease in the number of ports was also reflected in the decline of water transport as the main freight carrier. By 1920, not only had the railway captured the market for the collection and distribution of export produce and imported goods, but it also dominated the internal freight and passenger market. Road transport was still a disjointed feeder service engaged in short distance hauls from the producing areas to railheads and ports. This pattern of traffic reached its climax in the war years of 1940-45, when increasing agricultural production far exceeded the combined capacity of rail and water transport to cope with. Perhaps this chaotic situation of bottle-necks reorientated official policy into considering roads as a transport mode independently capable of performing a significant role in the social and economic development of the country.

In the immediate post-war years, a third phase in transportation development was entered. This is reflected in the Ten Year Development Plan of April 1946, when roads were considered an essential economic need and were accorded top priority for commencement. New roads were built connecting the major urban centres and the slight rail/road competition of 1930 now

entered a severe phase. By 1950 road transport had become the dominant freight carrier. The flexibility of road transport and its great ability to meet the changing demands of an increasingly complex and heterogeneous freight makret, in contrast to the slow and inefficient railway, make the former a more reliable transport mode. The railway has now lost traffic to road transport, just as waterways lost traffic to the railways in the early years of this century.

The above appraisal is an attempt to present in chronological order, the development of the various transport modes in relation to traffic. It can be generally summarized that the level of traffic has progressively increased over the years, but the dominant transport modes in hauling such traffic, have changed from waterways through the railway to roads. It is perhaps more realistic to view the entire sequence as a continuous process rather than as a series of disjointed historical stages.

The Present Level of Road Traffic

In the detailed analysis of traffic, emphasis will be laid on road transport, for this mode presents the dominant and interesting pattern. Traffic on the railway and inland waterways will only be mentioned *en passant*, seeing that the subject has already been given elaborate treatment in the chapters dealing with the respective modes. Road traffic is isolated for special discussion, because roads constitute today the principal medium for the movement of goods and passengers in internal commerce. The main source of information about traffic is the series of traffic counts carried out by the Traffic Section of the Ministry of Works. In each of the five divisions, there are approximately 30 census stations at which counts

are carried out for a period of one week in the months of January and July. Although such traffic census data have been collected for several years, they are essentially a volume count, and while some attempt has been made to determine classification and weight values, no reliable statistics have emerged. It is most likely that traffic peaks occur in the harvest periods of May, October and November, but in view of the fact that all counts are carried out in January and July, it is not possible to determine peak movements. However a 20-25% traffic increase over the volume of January and July is estimated.

The traffic flows recorded in the counts show a wide variation. The highest figure was 1719 vehicles per 24-hour day on the main highway from Freetown (mile 2), or nearly 72 vehicles per hour. The lowest value of 23 vehicles per day was recorded on the new Kambia-Samaia road in the Northern Province. Traffic density is, to a large extent, a reflection of the level of urbanization and economic production. Hence the highest traffic is found in the primate city of Freetown and its environs while, outside the Western Area, the Southern and Eastern Provinces with their high levels of commercialization, show high traffic densities. The economically-backward Northern Province exhibits the least traffic volume. At a point in the Central Business District of Freetown, sample counts have revealed over 16,000 vehicles per 12-hour day, and the peak hour traffic at this point was about 3500 vehicles per hour between 12 noon and 1 p.m. These very high values have no counterpart elsewhere in the country.

The general pattern as seen in Fig. 12.1 is for the flow to diminish sharply with distance from an urban area, emphasizing the traffic generating capacity of urban centres.

The traffic flow map for 1965 gives a clear picture of the distribution of traffic on the roads. About a third of the census points recorded flows of 0-100 vehicles per day, an appreciable number of points recorded flows of 401-500, whilst the points recording "1000 and over" were very few and confined to the Freetown area. In most cases, there is a general correspondence between road type and volume of traffic; the bigger flows are concentrated on the main roads while smaller flows are confined to the minor roads. This pattern at times breaks down when a minor road leads to a newly opened diamond mining site. This was the case on the Panguma-Largo road in the Kenema District, when traffic rose from under 15 to the unprecedented level of over 200 vehicles per day in three weeks. The average flows for the Western Area and the three Provinces are shown on Table 12.1

TABLE 12.1 REGIONAL TRAFFIC FLOW 1965 (Vehicles per 24-hour day)

Western Area	Southern Province	Eastern Province	Northern Province	National Average
545 Vpd	274	206	168	250

Source: Ministry of Works: Traffic Census 1964.

Composition of Traffic:

The previous section has given only a volume measure of traffic without reference to type of vehicle. The general absence of data has compelled the tapping of a number of separate sources to present some kind

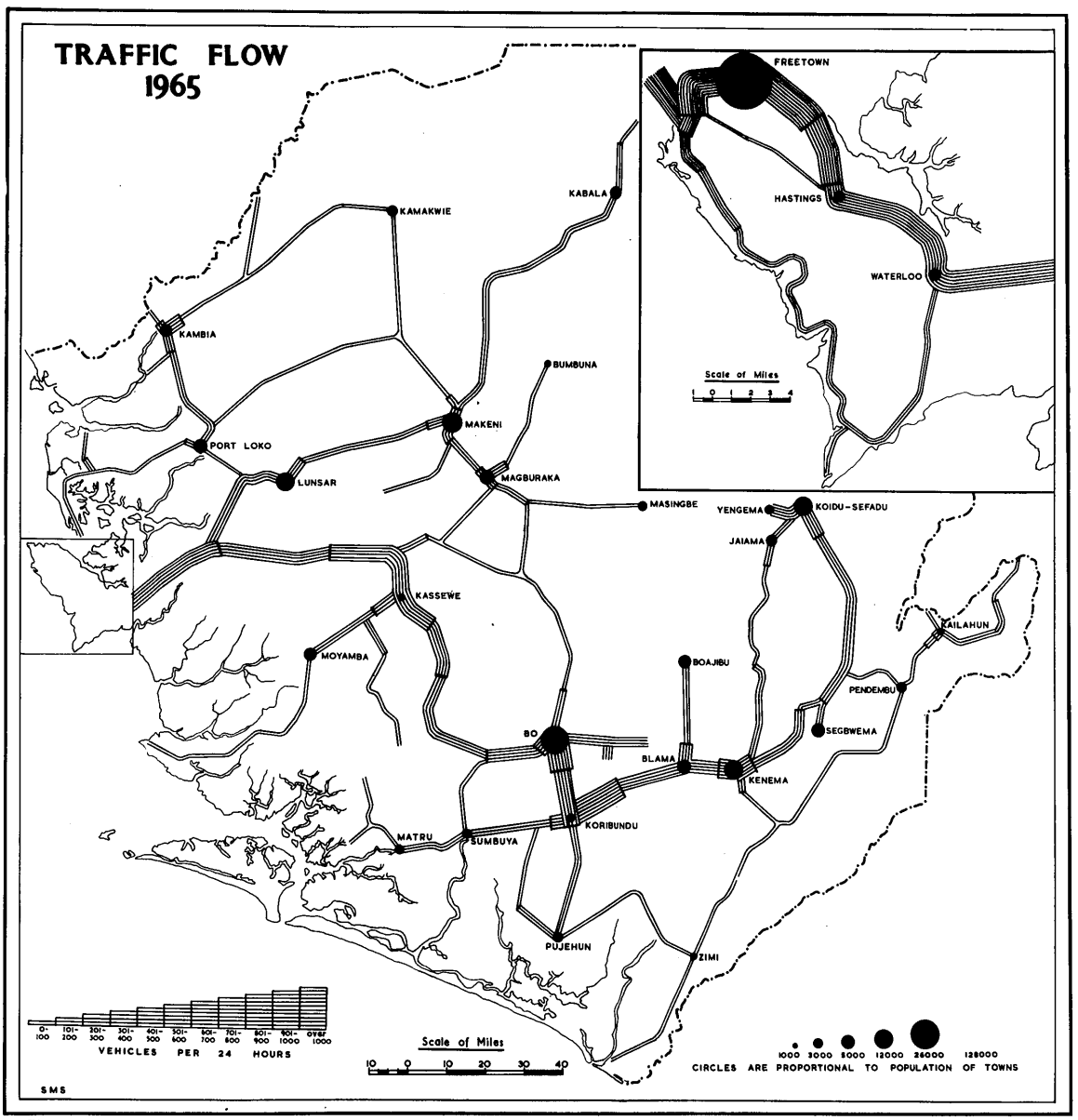

TRAFFIC FLOW
1965
FREETOWN
HASTINGS
WATERLOO
Scale of Miles
0 1 2 3 4
KABALA
KAMAKWIE
KAMBIA
BUMBUNA
MAKENI
PORT LOKO
LUNSAR
MAGBURAKA
MASINGBE
YENGEMA
KOIDU-SEFADU
JAIAMA
KASSEWE
KAILAHUN
MOYAMBA
BOAJIBU
PENDEMBU
SEGBWEMA
BO
BLAMA
KENEMA
KORIBUNDU
MATRU
SUMBUYA
PUJEHUN
ZIMI
0-100 101-200 201-300 301-400 401-500 501-600 601-700 701-800 801-900 901-1000 OVER 1000
VEHICLES PER 24 HOURS
Scale of Miles
10 0 10 20 30 40
1000 3000 8000 12000 26000 128000
CIRCLES ARE PROPORTIONAL TO POPULATION OF TOWNS
SMS

Fig.12.1.

of general picture of the relative importance of different kinds of vehicles. Evidence from vehicle counts at ferries suggest that, from the early period of road transport development to the immediate postwar years, traffic was mainly composed of lorries with an insignificant proportion of cars and light vans.[1] This was to be expected in a country where resource utilization was still at a very low level, and incomes for the bulk of the population were so meagre that ownership of cars was mainly restricted to the few colonial servants and the foreign merchant community. This pattern seems to have changed in the late 1940s, and the proportion of cars and light vans has steadily increased at the expense of lorries, with all factors pointing to the continuation of this trend.

The 1965 annual traffic count showed that approximately 65% of traffic was composed of cars and light vans as against 35% lorries, buses and extra-heavy vehicles (EHV). However, this broad pattern exhibits regional variations connected with level of urbanization, mining activity and agricultural production. Table 12.2 attempts to portray such variations, choosing roads situated in different areas, in order to establish a causal relationship between the various patterns and the relevant geographical phenomena.

Table 12.2 shows the predominance of the lighter types of vehicles in the Western Area which is a reflection of the high level of urbanization. This pattern is repeated to a lower degree in the immediate hinterlands of provincial urban centres like Bo with 67.6%, Kenema 67.4%, and Makeni 57.1% of total traffic represented by cars and light vans. However, with increasing distance from major urban centres, the composition of traffic on

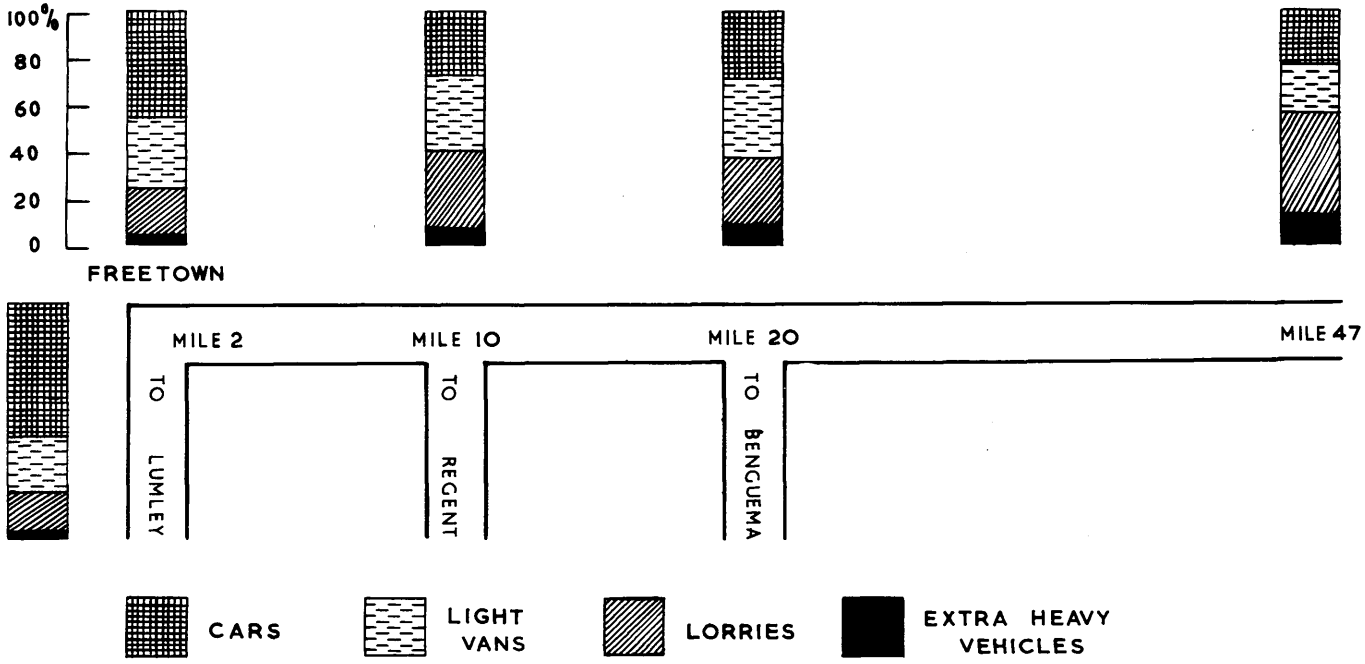
TABLE 12.2 REGIONAL VARIATION IN TRAFFIC COMPOSITION (%) 1965

Road	Cars	Light Vans	Lorries	EHV	Census Point
Freetown - Lumley	56.1	24.1	16.2	3.6	Mile 4
Freetown - Regent Junction	28.5	32.9	32.6	6	Mile 10
Bo - Freetown	30.3	25.3	44.7	-	Mile 68
Kenema - Koidu	26.3	20	44.6	9.1	Mile 38
Makeni - Bo	22.5	15	62.5	-	Mile 37

Source: Ministry of Works, Traffic Division, Freetown.

the highways changes with a rapid decline of lighter vehicles and an increase in heavier vehicles. This trend is well illustrated in Fig. 12.2. The conclusions to be drawn from these facts is that cars and light vans mainly constitute local traffic in urban areas, while lorries represent a large proportion of through traffic. The provincial variation in traffic composition is also a factor of urbanization and economic activity. The NorthernProvince, where these are least developed, has a higher proportion of lorries on the roads, while the Southern and Eastern Provinces with their higher level of economic activity, have a greater proportion of lighter vehicles. Minor roads generally have more lorries and major roads tend to carry more lighter vehicles. There is even a slight correspondence between traffic volume and composition; the larger the volume, the higher the proportion of lighter vehicles.

Changing composition of traffic with distance from an urban centre — FREETOWN



SMS

Fig.12.2

The Growth of Traffic

Whilst knowledge about the present level and composition of traffic is essential, it is also of great significance to have some idea of the way in which traffic is growing over time. Such knowledge will facilitate the rational planning of the road network to meet future demands of the country. This is important in a country like Sierra Leone where the road system, despite the controversy of the rail/road theorists, constitute the principal arterial network through which must be transmitted the urgently required agencies for economic and social development. In addition to the usual M. O. W. bi-annual traffic counts, other indices will be used here as evidence of traffic growth. Fig. 12.3 attempts to portrey the growth rates of petrol consumption, motor vehicles and freight carried both by road and rail; for these constitute a true reflection of traffic growth on roads.

In the early period of road development, certain factors militated against the growth of traffic. Prominent among these was the deliberate policy of not constructing a direct road link between the cash crop areas and the main port of Freetown so as to protect the interests of the railway. Even the 1941 break-through, when the army constructed the first road link between Freetown and Mile 47, subsequently extended to Kurubai Kamilla in the Northern Province, failed to stimulate a rapid development in road traffic. In the early post-war years, traffic increased steadily and in the 1950s, had reached such a volume that the slow moving, hand-propelled ferries which plied the major rivers, were in no way capable of

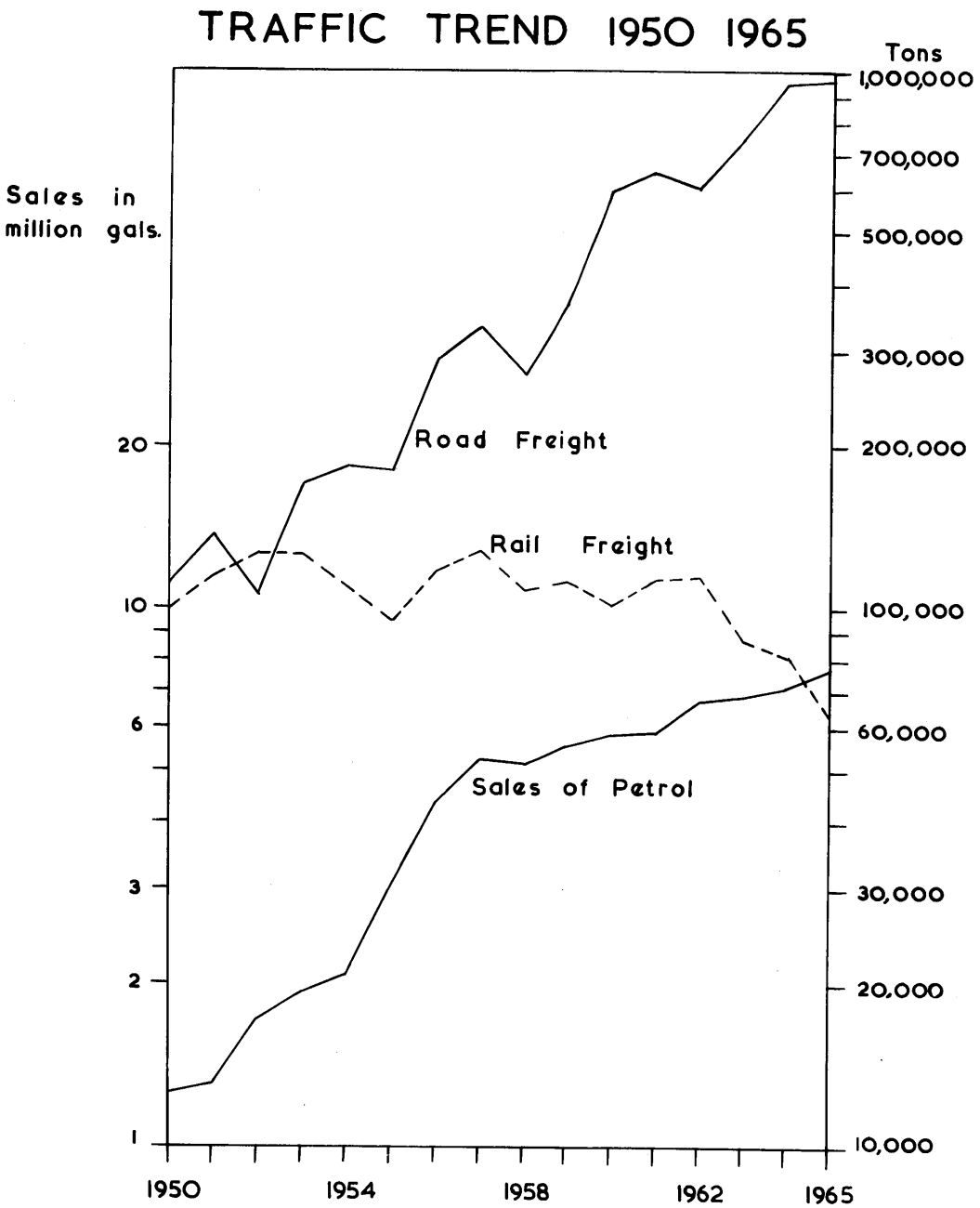

TRAFFIC TREND 1950 1965
Sales in million gals.
Tons
1,000,000
700,000
500,000
300,000
200,000
100,000
60,000
30,000
20,000
10,000
20
10
6
3
2
1
Road Freight
Rail Freight
Sales of Petrol
1950
1954
1958
1962
1965

Fig.12.3.

dealing with the heavier and faster lorries that had replaced those of war-time origin. The need for replacing the time-wasting ferries by bridges could no longer be overlooked and accordingly, a programme for the construction of twelve new bridges was begun with Colonial Development and Welfare funds. The opening of the major road bridges for the first time provided ferry-free direct routes linking Freetown and provincial centres. The resulting increase in traffic was alarming and the consequences were reflected in the briskness of trade, together with intense and extensive deterioration of laterite roads whose low carrying capacity had now been severely overtaxed.

Although the upward trend in traffic has been visible on all roads, the biggest increases have occurred mainly on the principal highways. Table 12.3 which portrays the average volume of traffic for the years 1960, 1962 and 1965, based on census counts collected from the five main roads in each region,[2] conclusively indicates that traffic growth has been most rapid in the Western Area and least in the Northern Province.

TABLE 12.3 AVERAGE VOLUME OF TRAFFIC

Year	Southern Province	Eastern Province	Northern Province	Western Area
1960	120	113	140	150
1962	200	280	230	275
1965	280	370	250	460

Source: Ministry of Works.

A causal explanation of such growth patterns may be found in certain geographical distributions, prominent among which are the location of primary producing areas, urban centres and population. Another important factor is inter-modal

competition in the form of rail and water transport. The phenomenal growth in the Eastern Province is closely linked to the fact that the cash crop producing and diamond mining areas are all located there. It is in these provinces that traffic growth on minor roads is significant, especially those serving mining areas as is the case with the Panguma-Lango road cited earlier. In Sierra Leone, traffic flow is much affected by town size and reference to the Traffic Flow Maps for 1962 (Fig. 12.4) and 1965, show that traffic growth is most pronounced on roads linking large urban centres.

An outstanding feature of road traffic is the amount of traffic that has been diverted from the government railway. Evidence in Fig. 12.3 points clearly to the decline of the railway as an important freight carrier, and the consequent large expansion of road traffic. However expansion due to this cause is largely restricted to the main roads of the Southern and Eastern Provinces, where the railway once played an important role in freight movement. In the Northern Province, the railway has never really been important and its decline has not greatly affected road traffic. The increase in general economic activity is bound to show itself in an increased demand for road transport, which will sustain the present upward trend in traffic growth for many more years. However some main roads will inevitably lose their traffic as more rational road alignments are adopted and implemented. This has already been the case with the Moulbara - Yele - Bo axis, whose traffic declined from 250 to less than 50 vehicles per day with the completion of the more direct and shorter mile 91 - Taiama - Bo road. The same may happen to the Koidu - Kenema road when Kono traffic is re-routed

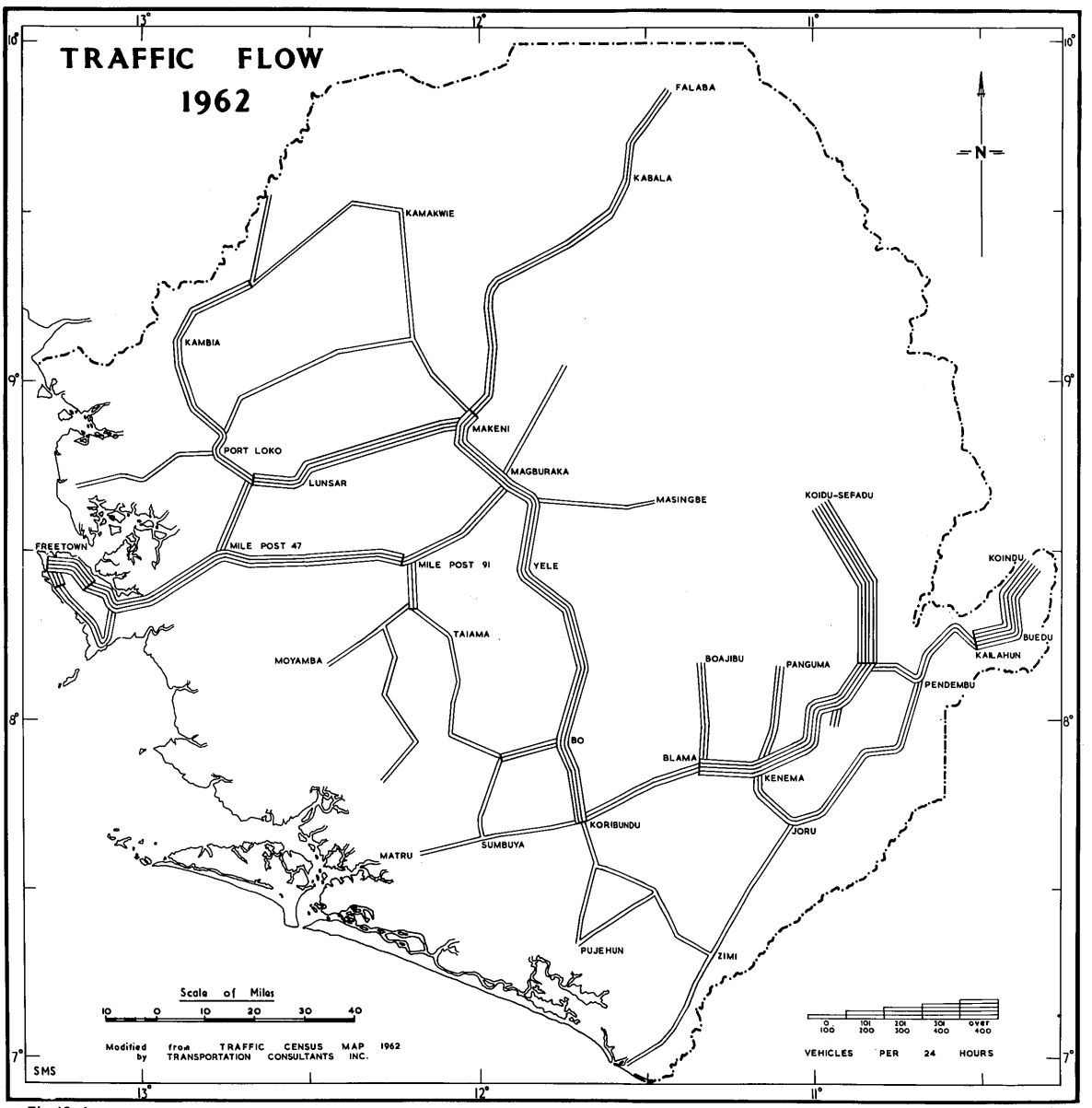

TRAFFIC FLOW
1962
FALABA
KABALA
KAMAKWIE
KAMBIA
MAKENI
PORT LOKO
MAGBURAKA
LUNSAR
MASINGBE
KOIDU-SEFADU
FREETOWN
MILE POST 47
MILE POST 91
YELE
KOINDU
BUEDU
KAILAHUN
TAIAMA
MOYAMBA
BOAJIBU
PANGUMA
PENDEMBU
BO
BLAMA
KENEMA
KORIBUNDU
JORU
MATRU
SUMBUYA
PUJEHUN
ZIMI
N
Scale of Miles
10 0 10 20 30 40
Modified from TRAFFIC CENSUS MAP 1962 by TRANSPORTATION CONSULTANTS INC.
SMS
0 100
101 200
201 300
301 400
over 400
VEHICLES PER 24 HOURS
13°
12°
11°
10°
9°
8°
7°

Fig. 12. 4.

to the new Jaiama - Massingbe - Freetown road axis, which is 91 miles shorter than the present route.

Pattern of Commercial Traffic.

On this subject, there is no published data; hence a series of small-scale surveys of commercial road traffic had to be carried out around the main transport centres, in order to supplement the meagre statistics on road traffic published by the Ministry of Works. It should be stressed that, although the information in this section provides the basis for a generalization of the commercial road pattern, the number of vehicles thoroughly examined is small. Hence the results are rather inconclusive. The vehicles surveyed are those which could be identified as being engaged upon commercial business. Those omitted, though regarded as private, may have some commercial interest which is very difficult to evaluate. The bulk of the vehicles examined consisted of lorries, light vans, taxis, buses and tankers.[3]

The main feature that emerges is that traffic tends to polarize around the major towns for here are concentrated the bulk of commercial activity. This does not imply that commercial traffic is very localized; on the contrary, a large proportion is made up of through traffic. The bulk of the commercial vehicles start and end their journeys in towns, but the towns may be separated by as much as 300 miles. A survey on the Freetown - Mile 47 road, which is the most important in the country, showed that 35% of vehicles interviewed had an average length of journey of 132.3 miles, while 19% had 245.4. The replacement of ferries by bridges has introduced a small proportion of long distance traffic, mainly on the Freetown-Koidu run,

but this dwindles to an insignificant level in the rainy season as the laterite roads deteriorate and become impassable. Local traffic is important in the immediate hinterlands of urban centres and tend to vary directly with the size of the town. Freetown has the greatest level of local traffic; about 70% of all traffic in the Western Area is local, consisting mainly of cars and light vans (poda-poda) engaged in passenger movement and commodity distribution. In the provinces, local traffic is rather limited serving mainly as a link between towns and the surrounding rural areas, and lorries are not important in affecting these links.

From the earliest stages of road transport development, demand was mainly for a combination of passenger and freight service. Even at the present stage of economic and social development, with the decline of the railway and the emergence of road transport as the principal carrier, the nature of the demand has not changed appreciably. This demand is met by an assortment of vehicles ranging from Land Rover Station wagons to trucks known throughout English speaking West Africa as "Mammy wagons".[4] The latter have standard truck bodies into which, and occasionally on which, passengers and freight are piled together. However, incipient specialization in vehicle types, a feature common to all West Africa, has introduced privately owned buses catering primarily for inter-urban passenger travel, thus breaking the mammy-wagon monopoly on passenger services. This new trend is a step forward in the progressive evolution of a modern, specialized transport system.

The Road Transport Corporation, (RTC), formerly Road Transport Department (RTD), was introduced in 1929 but restricted its services mainly

to Freetown and its environs. However in 1955 it started a provincial service linking Freetown with Makeni and Port Loko, but this proved a failure due to lack of patronage. In 1965 the RTC extended its bus services again to the provinces providing regular day runs from Freetown to Port Loko, Lunsar, Makeni, Bo and Kenema. The RTC caters for [illegible] passenger traffic only, and since it has to compete with the railway and private lorry operators in this market, fares charged are usually far below the cost of producing the service. Hence in the first year of operation, it showed a deficit of Le 242,000. To offset this deficit, the RTC might revise fares upward, but this can be fatal especially with growing competition from private bus operators and poda-podas undercutting rates. A second course would be to explore new routes which are not now served by an organized form of transport, yet have a substantial traffic potential. Thirdly the RTC should enter seriously in the freight business by acquiring a large fleet of heavy lorries.

Freight movement by road is complex both in the type of load and the organization of commercial carriers. Vehicles examined were found to be transporting a great variety of goods with export commodities like cocoa, coffee and palm-kernels predominating on the "down traffic". Imported goods ranging from mining machinery through cotton fabrics, petroleum products to radio sets, dominated the "up traffic". Produce for local consumption was distributed on all the roads. The only pattern that emerged is a geographical distribution of freight types in that, in the south and east, cash crops appear much more frequently in full lorry loads, while the economically backward north is characterized by a greater proportion of

lorries carrying an assortment of freight and passengers.

The movement of this varied assortment of goods requires the use of different types of equipment, the coordination of vehicle schedules with the receiving and shipping schedules of the customer, and a complex system of charges. These factors dictate the need for the closest relationship between vehicle operators and users. In Sierra Leone, regulatory control requires that commercial vehicles be registered into "A" or "For-hire" lorries and "B" or "private" lorries. Class "A" lorries are required to operate anywhere but can only transport the owner's goods. Reliable police opinion unfortunately confirms that enforcement of these regulations is impracticable owing to evasions by vehicle operators. These two classes of lorries, despite the illegal duplication of services, satisfy the road transport needs of the country. Big commercial firms and highly capitalized traders often rely mainly on class "B" vehicles to carry their goods, but with the recent restrictions favouring Sierra Leonean transport operators, it is most likely that commercial firms will increasingly come to utilize class "A" vehicles. Small-scale traders and other individuals solely depend on class "A" vehicles. The traders usually carry commodities for sale to a market point, or occasionally contract with lorry operators for the delivery of goods. It is for such small-scale shippers that the mammy-wagon with its passenger/freight combination is an ideal carrier. This type of transport, with its flexibility in securing full loads, has effectively served the social and economic development of the country, and minimized under-utilization of capacity.

The main problem in the for-hire carrier system is the difficulty of small shippers in ensuring that their goods are carried to their destination without damage or loss. The available alternative of either accompanying the goods or hiring a whole truck for a small shipment are time-wasting and uneconomic. To achieve efficient utilization of the for-hire service, it will be necessary for the small unorganized truck owners to merge into financially strong regional or national truck fleets. The emergence of such large-scale operations will minimize the problem of truck capacity under-utilization incident on specialization; improve the return load problem and provide adequate security for small shippers. This is a basic prerequisite for the economic transportation of freight and maximum utilization of equipment.

Utilization of Capacity

The utilization of capacity by road transport is a question of great practical importance; for many transport owners have complained about the under-utilization of their vehicles, while some observers have pointed out that no vehicle ever runs below capacity.[5] The last observation is an obvious exaggeration, since no transport industry could operate at full capacity all the time, given the uneven spacing of demand geographically and in time. The actual pattern is that utilization of capacity fluctuates depending on such factors as harvest season, climate and vehicle destination.

The measurement of the utilization of capacity presents great difficulties, since it is impossible to obtain any information about the weight of freight carried. It was finally decided to record capacity under broad categories similar to an earlier experiment by the Public Works Department. The terms

'full' and 'empty' used below are fairly self explanatory, but 'half full' is liable to subjective variation and should be treated with more caution.

In the 1940s and early 1950s, counts on the ferries revealed that at least 50% of all lorries were travelling empty.[6] Such low utilization of capacity can largely be related to the then low level of economic activity, effective competition from the railway and a population that was not very mobile. However the pattern has changed in the 1960s and a higher proportion of capacity is now in full use. On most of the main roads, it is usual to find that 35% of all commercial vehicles are travelling full, 46% half full and only 19% empty.[7] The seasonal fluctuation in capacity is a reflection of climatic control on some of the economic activities of the country. In the rainy season, agriculture and diamond mining are at a low level of production and people tend to be less mobile. In the dry season, harvesting of crops begins, African alluvial diamond mining is in full operation and the population once more becomes mobile. Hence the greater road activity in the dry season whenfreight and passengers are easily available.

Another feature to emerge from the analysis is the peculiar pattern of capacity utilization on the down traffic to, and the up traffic from, Freetown. It is observed that the proportion of empty vehicles in the up traffic is usually smaller than in the down. This is due to the fact that Freetown, being the main port, offers greater possibility for freight and is the base of operation for many vehicles. The down traffic lacks the advantages of a big traffic generating centre like Freetown; passengers

and goods have to be collected from relatively small dispersed centres and competition is severe. Hence it is not surprising to see lorries on the down traffic, loaded with fire wood which is sold in Freetown to "cover the cost of petrol", as the drivers succintly put it. This excess capacity in the down traffic run has its effects in causing ridiculously low freight rates for cash crops like cocoa and coffee, a situation which is being exploited by the Sierra Leone Produce Marketing Board. Such excess capacity is not encountered on the inter-province traffic, although there are fewer fully loaded vehicles while some are dangerously over-loaded. The pattern here is for most vehicles to be half full.

Lastly one can conclude that a large proportion of total capacity is in fact utilized. The proportion of lorries running empty is small and most are fairly full all the time. This situation has been greatly helped by the lack of any official policy forcing specialization, thus making the industry very flexible in being able to combine both passengers and freight to avoid under-utilization of capacity. However, the increasing demand for specialized vehicles, particularly for distribution work, is likely to introduce a higher percentage of empty running on return trips to Freetown where all the new industries are concentrated. To avoid this excess capacity, industrial planning must be reorientated from the present concentration in Freetown, to a more even distribution that will ensure freight availability on all the vehicles' runs.

Conclusion

One feature missing from the above analysis of road traffic is the Origin and Destination(O & D), series with its corollary of total vehicle/mileage over any period of time. Several attempts have been made to collect O & D data but, despite their vital importance in planning and programming a rational development of a highway system, the uncooperative attitude of vehicle operators has consistently foiled these attempts. An intensive educational programme aimed at making vehicle operators appreciate the desirability of O & D statistics is a necessary prelude to any serious collection of such data.

Finally, the pattern of road traffic revealed by these surveys is one of a vigorous and well-utilized industry engaged in serving a market for passengers and freight. The market, despite its considerable size, is yet not developed enough to be split into specialized sections. A great majority of vehicles are engaged in transporting a large variety of goods in conjunction with passengers. The passenger sector forms a very important part of the entire industry, especially in the diamond mining area, where a large concentration of people and economic activity are most effectively served only by road transport.

REFERENCES AND NOTES

1. Road Transport Dept. Annual Report. (Freetown: Govt. Printer, 1941) p. 6.

2. Ministry of Works: Unpublished Road Census Data.

3. With the help of Divisional Engineers, the author carried out in late 1964 and early 1965, a series of sample traffic census around the important transport centres. The data obtained have been greatly supplemented by the results of another 7-day traffic census (June 1966) in which the author participated, at Mile Post 47, by ITALCONSULT.

4. In Liberia there are no "Mammy-wagons" in the functional sense used in this context. Lorries do not generally serve a combination of freight and passenger demand; the industry is relatively more specialized with taxis and buses catering almost exclusively for passengers, while lorries concentrate on freight.

5. Personal conversation with Yamba Kanara, Secretary, Motor Drivers Union, Freetown, November, 1966.

6. Ministry of Works. Unpublished Data on Vehicle Counts at Ferry Crossings.

7. Road Transport Dept. Annual Report. (Freetown: Govt. Printer, 1962), p.

CHAPTER 13

COSTS, RATES AND CHARGES IN ROAD TRANSPORT

The chapter is solely devoted toroad transport for it is here that very little is known about the structure of costs, rates and charges and the complex factors influencing them. There is already an appreciable amount of literature on the structure of rail costs, rates and charges. Devoting this entire chapter to road transport is largely justified by the fact that it is today the most important transport mode, and the only one where the factors of supply and demand play a tremendous role in pricing the service. It is also of interest in that it represents a major avenue for indigenous African investment, and a significant testing ground for the Sierra Leonean's ability to participate profitably in the economy of the country. Finally its tremendous significance to the society and economy of the nation is not matched by a similar level of documentation; hence the utmost need to analyzein detail, the cost structure, pattern of rates and charges, and the various controlling factors in the road transport industry.

Cost of Road Transport

The cost of road transport to the consumer of the service is a function of rates and charges which are again dependent on the cost of producing the service. It is common for the cost of utilizing the service to be directly related to the cost of producing it, when there is active competition and when government regulations neither prevent free entry nor regulate prices in the industry. In Sierra Leone, road transport is characterized by a large number of small-scale operating units. Most freight and passengers

are dispersed in comparatively small quantities, hence the incentive to operate large firms is minimised because the advantages of economies of scale are lacking. However, with increasing agricultural production and rising consumption patterns, freight availability will in the near future improve. This will encourage the development of large-scale units of operation and functional specialisation in the industry. At present, the predominance of the small-scale operators makes for a high degree of intra-modal competition, which helps to keep rates in line with cost especially on the more frequented routes.

A common obstacle in the following analysis is the extreme difficulty of obtaining accurate cost and revenue data. The reasons for this vary from the operators' suspicion that such inquiries may be somehow related to taxation, to the fact that the practice of accounting has not yet developed to any extent among transport operators. Thus the information gathered is of limited general applicability, and only represents the broadest picture of costs and receipts - for this was all the detail that most operators honestly possessed. However, additional information obtained from vehicle dealers and insurance firms, has adequately supplemented the data obtained from operators, so that a pattern of costs, rates and charges, has eventually emerged, which, though highly generalised, is fairly representative of the small firms.

Costs of vehicle operation

The cost involved in vehicle operation can be divided into three groups. First, there are the costs which are directly related to the vehicle mileage run, such as fuel costs, lubricants, tyres, repairs and maintenance.

Secondly, there are the overhead costs which do not vary with mileage; these include insurance, licensing and registration fees and the wages of drivers and apprentices. Finally, there is a third class of costs which relate to the capital used in obtaining the vehicle, such as the depreciation charge and the interest charge on the capital, especially if this is borrowed in the form of a hire purchase transaction. All three costs can be normally quantified, but in Sierra Leone, the relevant information is so limited that only case studies can be relied upon to give an idea of these costs.

The example to be considered below is that of an owner operating only on a small scale. He has one vehicle, a Morris Van which is used as a "poda-poda" and caters for both freight and passengers engaged on short journeys. The vehicle is new and was supplied with a body. The latter point is significant because most big commercial lorries are imported in the form of a chasis with engine mounted; the building of the truck is the owner's responsibility. Such trucks are invariably constructe with plywood and cost from Le 240-Le 260, and this increases the total of the overhead costs. It is evident from Table 13.1 that the annual costs, without making provision for depreciation or profit, amount to Le 2974.20 which is Le 247.80 per month or Le 9.50 per working day. The vehicle concerned is a petrol powered engine and fuel consumption alone accounts for over 50% of the total annual costs. For diesel commercial vehicles with a better fuel - mile ratio, costs tend to be lower, about 30 - 35% of total annual costs.[1]

TABLE 13.1 EXAMPLE OF VEHICLE COSTS - Morris Van (Jan - Dec. 1966)

		In Leones
1.	Capital Costs	
	Purchase of Vehicle	2200.00
2.	Overhead Costs	
	Licence and Registration Fees	130.00
	Comprehensive Insurance	464.10
	Wages	288.00
		882.10
3.	Running Costs	
	Petrol and Lubricants	1560.00
	Tyres and Tubes	73.60
	Subsistence Allowance	156.00
	Major Repairs	178.00
	Minor Repairs	35.70
	Servicing	27.50
	Spare Parts	61.30
		2092.10
	Total Annual costs (2 + 3)	2974.20

No mention has been made of depreciation charges, but this is an important element, since its accumulated value should be sufficient, at the end of the vehicle's economic life, to replace it at the current prices. This loss of value in the vehicle is the result of two causes. The first, wear and tear, arises from the fact that capital equipment, regardless of maintenance and service, will become less efficient in use and will

ultimately need to be replaced. The critical point of replacement is usually reached when the cost of repairs and maintenance soar to such heights, that it is more economical to replace the vehicle than meet the increasing costs of operation. The second source of loss is the problem of obsolescence, for new and more efficient vehicles are constantly being introduced in the market. Their greater technical efficiency makes them produce the same output either in ton/miles or passenger/miles at a lower cost. Thus it is more economical to scrap the old vehicle type and invest in the more efficient new type. It must also be mentioned that the behaviour of the market shows a distinct preference for new vehicles and new vehicles types especially in the passenger sector.

At present no accounting procedure exists in the industry to determine correctly the depreciation charge, despite the tremendous importance of such a cost element in a country where the vehicle's average life ranges between 18-24 months.[2] Both the numerous small African operators and the large transport concerns such as the Road Transport Corporation, are faced with the same problem of depreciation and maintenance. They however vary in their approach to the problem. The bigger concerns usually succeed in operating their vehicles for a much longer period than the small African operator; the latter are resigned to a short working life for their vehicles.

Because of the shortage of well equipped maintenance facilities and the expensive services of the few good ones, small transport operators have to rely for maintenance and repairs either on replacement of parts - a substitute for scarce domestic skills - or utilize the cheap services of technically backward repair shops. Rarely do they use the well equipped

garages, and it is not infrequent for some of these operators to turn mechanics and do their own maintenance and repairs.

The situation of maintenance by replacement not only puts a heavy demand on spare parts, but also influence the choice of vehicle make. In Sierra Leone the long standing popularity of the Bedford lorry is partly explained by the constant availability of spare parts, while a serious obstacle in the extensive use of the Toyota diesel lorry is scarcity of spare parts. Many such vehicles have to spend long periods of inactivity awaiting the arrival of a vital spare part from Japan. Further, the situation has inevitably led to serious profiteering in the market and the sale of non-genuine spare parts. The position became so alarming that government had to institute, in 1965, an enquiry into the sale of spare parts and to recommend ways and means of improving the situation. The extent to which maintenance by replacement operates is illustrated in the case of the previously mentioned Morris Van. The owner is moderately successful and operates mainly in the Western Area. The vehicle is of British manufacture and does about an average of 100 miles a day on both tarmac and laterite roads. For the 12 months of operation (January - December 1966) the owner, who is literate and very particular about his vehicles, had replaced the carburettor, brake linings (three times), horn, water hose, springs, brake drums (two times), valves and plugs, universal joint and shock absorbers. Such maintenance methods involve a substantial expenditure but are often the only way open to the small operator.

The problem of depreciation has the same importance to small-scale operators as it has for the big firms. The significant difference between

the two is that, while the small operators accept a short economic life for their vehicles, large-scale operators try to run theirs economically for a longer period. For example the Road Transport Corporation with a commercial fleet of 61 vehicles in 1965, expects each properly maintained vehicle to last for 5 years. This involves the employment of skilled mechanics and equipment capable of carrying out all sorts of repairs. These facilities can result in very heavy overhead costs, and it becomes only profitable when the size of business is large; small firms cannot afford to run their own maintenance facilities. In this way big concerns are more efficient, since they are able to operate at a lower true cost per mile in order to earn the same profit.

It can now be seen that the attitude of the two sectors in the industry towards their vehicle's economic length of life is controlled by two factors. One is the scarcity and resultant high cost of skilled labour, which renders the small operator reluctant or unable to avail himself of better quality repair facilities. Only the big transport concerns, on account of their larger scale of operations, can profitably use such services. The second factor is that small operators tend to rely heavily on replacement of parts in place of skilled maintenance. Despite these unfavourable economic conditions in the small firm's operational costs, a good number do make a profit and are able to stay in business. Some, however, do not usually earn a sufficient margin of profit to offset the depreciation charge on the invested capital, and are soon forced out of the industry.

Rates and Charges

The discussion of the pattern of rates and charges presents a difficulty arising from the variations in local conditions throughout Sierra Leone. Hence

TABLE 13.2 COST OF HIRING A 5-TON LORRY (in Leones)

Freetown to	1951	1957	1966
Bo	45.00	34.00	30.00
Blama	50.00	42.00	45.00
Kenema	50.00	42.00	50.00
Segbwema	60.00	50.00	55.00
Pendembu	70.00	54.00	55.00
Makeni	30.00	24.00	30.00

INDEX OF CHANGE

Freetown to	1951	1957	1966
Bo	100.0	80.0	67.0
Blama	100.0	84.0	90.0
Kenema	100.0	86.0	100.0
Segbwema	100.0	83.0	92.0
Pendembu	100.0	77.0	78.0
Makeni	100.0	73.0	100.0
Magburaka	100.0	73.0	100.0

Source: Data for 1951 and 1957 based on Dr. N.A. Cox-George, 1966 figures are averages based on information collected from transport operators and Messrs. U.A.C. Ltd.

generalizations mainly represent what obtains on the major roads. However conditions in particular areas will be illustrated as factual case studies.

On the whole, rates and charges are high in comparison with countries like Nigeria and Kenya. The passenger/mile charge for Nigeria is 1.0. cent against Sierra Leone's 1.7 cents, and the former's ton/mile cost is about 6.5 cents against the latter's 10.1 cents. In comparison with the railway rates and charges, road transport is cheaper especially in areas served by both rail and road, but inareas where there is no railway service, road transport rates tend to be high. The comparative low road charges have been a major factor in the competitive position of the country's agricultural exports in the world markets, in facilitating the tremendous growth of internal trade, and in promoting a high degree of human mobility. In fact rates and charges have decreased in relation to the level of prices and incomes in the last 25 years, hence the real cost of road transport services has actually fallen. This trend is shown in Table 13.2 where the cost of hiring a 5-ton lorry has been plotted for 1951, 1957 and 1966, and the index of change indicated using 1951 as base 100. The trend reveals an overall decline in charges; the decrease is most pronounced at the 1957 level when there was a large number of non-African operators running big fleets. Their presence tended to decrease rates and charges. At the 1966 level, charges have shown an appreciable upward trend compared to 1956. This is due to government legislation which has virtually prohibited non-Sierra Leonean citizens from participating in the "for hire" sector of the industry, so that today there is a predominance

of small-scale operators whose size of business necessitates comparatively high rates for profitable operation.

There are two distinct markets for transport which should be distinguished whenrates are discussed, these are the carriage of passengers and the movement of freight which includes food crops, imports and exports. The rates exhibit regional variation due to such factors as road quality, rail competition, level of demand and supply of vehicles. Usually rates tend to be low in areas where a combination of good roads, rail competition and high level of demand, exists. It must be emphasised at this point that neither rates nor charges are fixed, bargaining is still a dominant phenomenon in the industry and rate variation is tremendous. Perhaps this bargaining is a carry over from the Lebanese/Syrian trading methods copied faithfully by transport operators, many of whome had acquired the capital to start their business,by serving for long years as drivers to these Lebanese traders.[3]

Passenger Market

The carriage of passengers is not as lucrative as the haulage of freight, for in the former case there exists intense intra-modal competition. In freight haulage, vehicles are relatively few and competition less. Fig. 13.1-A is a representative pattern of average passenger/mile charges for the whole country. There is an obvious tapering effect though the rate of decrease over given distances varies immensely. As should be expected, short distance journeys carry the heaviest charge (2.87 cents per passenger/mile for journeys within the 25-mile range), and the charges decrease progressively with distance to reach the average minimum of 0.84 cent per

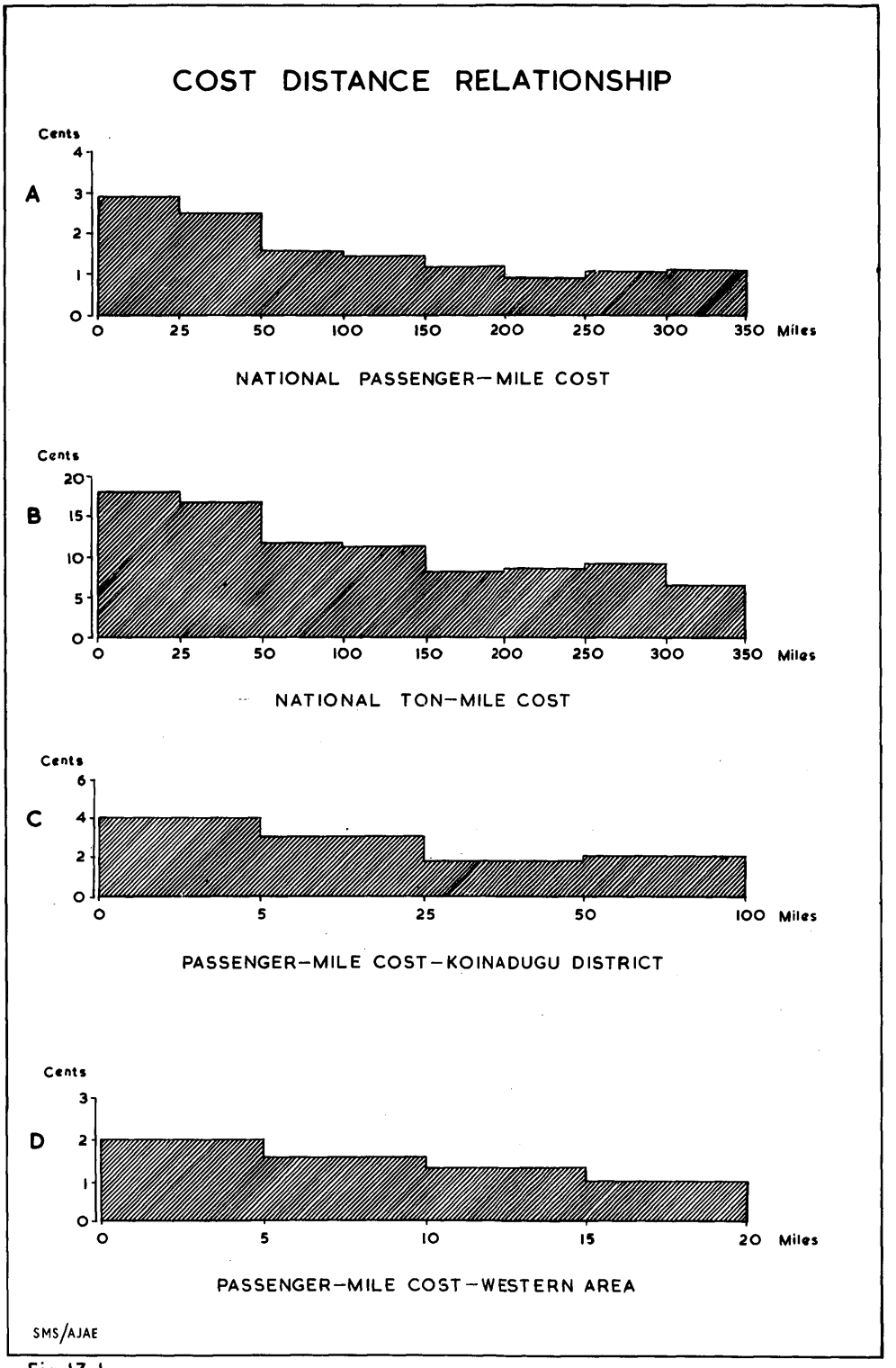

COST DISTANCE RELATIONSHIP
Cents
A
4
3
2
1
0
0 25 50 100 150 200 250 300 350 Miles
NATIONAL PASSENGER—MILE COST
Cents
B
20
15
10
5
0
0 25 50 100 150 200 250 300 350 Miles
NATIONAL TON—MILE COST
Cents
C
6
4
2
0
0 5 25 50 100 Miles
PASSENGER—MILE COST—KOINADUGU DISTRICT
Cents
D
3
2
1
0
0 5 10 15 20 Miles
PASSENGER—MILE COST—WESTERN AREA
SMS/AJAE

Fig. 13. I.

passenger/mile for journeys of up to 250 miles. Beyond this critical limit, rates show an increase with distance (Table 13.3). This may be explained by the fact that beyond 250 miles, a lorry exceeds its competitive economic distance and operational costs will tend to rise. Hence most journeys are within the 50-200 mile range.

TABLE 13.3 COST-DISTANCE RELATIONSHIP (in cents per Passenger/Mile)

Distance in Miles	Charge	Rate of Charge	
		Decrease	Increase
0-25	2.87 cents		
25-50	2.49 "	13.3%	
50-100	1.53 "	38.6%	
100-150	1.48 "	3.3%	
150-200	1.19 "	19.6%	
200-250	0.84 "	29.5%	
250-300	1.05 "	= =	25.9%
300-350	1.07 "	= =	1.9%

Passenger fares show an appreiable regional variation. They are low for traffic plying between the Western Area and the provinces, and high for inter-provincial traffic. Relevant average figures are 1.3 cents for the former and 2.1 cents per passenger/mile for the latter, indicating that fares for Freetown-based passenger traffic are about 62% of provincial-based traffic. The difference in charges is largely a function of greater demand,

better quality roads and greater competition in the Freetown area. In the provinces, passenger fares are generally high, but within this general structure is a noticeable provincial variation. The Southern Province exhibits the least charge, 1.65 cents per passenger mile followed in order of magnitude by the Eastern Province, 2.1 cents and the Northern Province 2.6 cents. Several factors interact to produce this regional pattern.

Most of the major towns in the province are served by both rail and road so that users have the choice of two modes. Transport operators keen on capturing a profitable share of the passenger market, normally have to charge fares that are competitive with the railway's 3rd class rates, since the bulk of the passengers is composed of low income earners. In the east, only three main towns enjoy the advantage of being served by both rail and roads. Areas beyond Pendembu and the whole of Kono district where a large amount of passenger traffic is generated, are not served by rail. This lack of rail competition has produced the high charge of 2.14 cents per passenger/mile. Furthermore, road quality in the area is extremely poor and vehicle operational costs are very high. Even the high demand and the available large fleet of vehicles (1725 or 51% of all provincial registered vehicles in 1965), which should normally produce inter-modal competition leading to a scaling down of charges, are insufficient to lower substantially the rate structure. In the north, roads hold a virtual monopoly over all journeys because rail transport is poorly developed. Road conditions are extremely bad and demand is neither high, nor sustained. Vehicle operators in contrast to those in the south and

east, lack export traffic since very little cash crop production is carried out in the area. All these factors operate to make the northern passenger fares the highest in the country.

Before concluding the discussion on passenger fares, it is essential to introduce two case studies. These deal largely with local traffic in the Western Area and in the Koinadugu District. They have been selected because they offer extreme examples of local conditions. In the Western Area, there is a very high demand for road transport services, and there are about 3000 commercial vehicles catering for the demand. In Koinadugu District, demand is extremely low and there are about 25 commercial vehicles to meet the needs of an area that is about one-fifth of the size of the country. The above differences have produced a pattern of charges which can be seen in Figs. 13.1-C and 13.1-D.

Fares in the Western Area are lower than those in Koinadugu District, the former being 1.4 cents and the latter 2.6 cents per passenger/mile, a difference of 1.2 cents or 86% of the Western Area charges. This high variation is the result of several factors. The better quality roads of the Western Area make for comparatively low operational costs, while the poor quality roads of Koinadugu impose a tremendous wear and tear on vehicles which increase the cost of operation. Demand in the former is high so that vehicles can operate more journeys in a given time, and the consequent greater earning possibility makes for lower fares. Demand in Koinadugu is low and vehicles do a single round trip a day. Given that none of these vehicles is ever filled to capacity, operators, especially

when competition is limited, tend to make all their profit from the small available passenger traffic, and this leads to extremely high charges. The distance - cost relationship for the two examples shows that, in the Western Area, there is a continuous tapering effect (Fig. 13.1-C) with increasing distance, whereas in Koinadugu this feature operates mainly in the first 50 miles from Kabala (Fig. 13.1-D). Beyond this critical distance, charges tend to increase with length of journey.

Freight Market

The freight market can be divided into two parts. The most lucrative is that for exports and imports, while the market for the carriage of domestic trade goods is of secondary importance. Vehicles engaged in the carriage of import/export goods also serve the market for internal trade goods. These are marginal to both the import/export and passenger markets. In general freight rates are higher for imported goods than for export produce. The transport rates for produce are often influenced by the practice of the Sierra Leone Producing Marketing Board (SLPMB) of paying a flat rate of Le 400 per ton to agents, for transporting produce to Freetown, regardless of the agent's geographical location. Another important factor is the prevalent practice of small operators obtaining their vehicles by hire purchase. The general rule appears to be the payment of about half of the total cost of the vehicle, and a regular monthly installment equivalent to one-tenth of the remainder so that the vehicle is completely paid for within the initial comprehensive insurance period of twelve months. Sometimes the vehicle dealers tie a haulage contract to the transactions,

and the proceeds from the carriage of goods can be used to meet the hire purchase payments, and frequently the cost of fuel and spare parts. Transport rates under these conditions are often very low; the only economic advantage being the full utilization of the vehicle's capacity.

The low produce rates offered by road transport can be explained by the need to secure back-haul traffic and eliminate the uneconomic return of empty vehicles. Since the vehicles will have to return to Freetown at any rate to move the valuable import traffic, any revenue that can be made on such return trips is highly advantageous. This is much more so for unregulated lorries, which can quote rates almost entirely unrelated to the real service performed in order to stimulate back-haul traffic. The back-haul problem creates a great deal of instability in rate structure, but such traffic is absolutely essential to avoid the economic waste of running empty trucks.

The rate structure in the carriage of imported goods reflects the railway's practice of charging a commodity on the basis of its inherent value. Since imported goods are very valuable, the charge for them is high both for rail and road transport. Every transport operator and transport mode capitalize on this valuable traffic and it is much sought after. In fact lorry owners depend on it to make their profits and every other traffic, including export produce, is marginal to it. Generally the ton/mile cost for imported goods is about 15.6 cents, and in areas where the modifying effect of rail competition is absent, the ton/mile cost may be as high as 21.0 cents. The freight market for imports, like that for exports, is well organized and permits operators to plan regular runs with full loads. It

is this characteristic that makes operation in the import/export freight market the most profitable in the industry.

The market for the carriage of local products is not highly organized; they move in small quantities although in the aggregate they amount to a substantial tonnage. Their movement is mainly in the hands of small traders who utilize the all purpose lorry, which is ideal for the combined movement of small quantities of foodstuffs and passengers. In railway served areas, there is some competition in the carriage of local produce especially towards Freetown. Even with such competition, road transport still enjoys a comparative advantage because of the small-scale nature of the average load, possibility of direct delivery to markets and the relatively short length of journey involved. There is no easily recognizable pattern in rate structure for local products. What seems clear is the high degree of bargaining involved. It appears that operators base their charges on the equivalent passenger earning capacity given over to freight; this inevitably leads to a cost discrimination between different kinds of products. Goods which are heavy, compact and of low weight/value ratio are charged less, whereas products which are bulky, are invariably charged more to compensate for the greater passenger space given up.

Having discussed on a fairly general basis the structure of rates and charges, it is essential to introduce at this point certain important factors which modify the generalized pattern presented above. A very important factor is road quality. The varying conditions of road surfaces produce a big influence on the cost of transport to the consumers. They affect the cost of operation by causing big differences between the wear and tear on vehicles that operate on the different road surfaces. The differentials

involved are best seen in the following examples. The passenger/mile cost from Freetown to Port Loko, a distance of 75 miles, is 1.3 cents while the cost from Bo to Kailahun, a distance of 71 miles, is 2.1 cents. This big cost difference is most likely explained by the fact that the Freetown - Port Loko road is tarmac-surfaced, while the Bo-Kailahun road has a poor laterite surface.

Remoteness is another factor that tends to increase rates and charges especially when such areas also coincide with a poor development of traffic. Vehicle-runs are infrequent because demand is low and, most times, vehicles are chartered to go to such places. Under these conditions, one has the extreme situation where both the lorry owner and the person hiring the vehicle, want to make profits from the available traffic, and this is reflected in the high charges that obtain. For example, to hire a vehicle from Kabala to Kurubonla, a distance of about 100 miles, costs Le 40.00 producing a passenger/mile charge of 2.0 cents for a maximum load of 20 passengers. Other examples are provided by passenger/mile charges from Kenema to Daru, a distance of 36 miles, The former, side tracked by the main stream of eastern vehicular traffic, bears charges of about 3.3 cents while Blama, situated on the main route for eastern traffic, bears a charge of only 1.5 cents, a difference of 1.8 cents.

Another factor of some importance is the hiring of vehicles. Small-scale traders often charter a lorry to carry their goods and in the process, may collect passengers to provide a full lorry load. There are two cases where vehicle charter is important. One is the situation where there are considerable

advantages to be gained by the possibility of transporting one's goods direct to the point of sale. There may be several vehicles offering to transport the same goods - and perhaps at a cheaper rate - but these vehicles will usually stop at numerous points along the route to collect passengers, whereas a chartered vehicle can proceed straight to the required destination. The second situation is when a route is not frequented by vehicles and operators have to be tempted to travel on it. This is achieved by the charter process. Usually such journeys lead to remote areas with poor quality roads and low demands. To serve the peripheral areas of Sierra Leone, especially in the north, the charter system is of tremendous importance. For example in Koinadugu District, most journeys beyond the district headquarters of Kabala are undertaken on a charter basis. The charter price is usually high which is in turn reflected in high rates and charges.

Conclusions

Many significant generalizations have been attempted concerning rates and charges; these however, should be treated with caution so as not to mask the several complexities involved. The following salient points have emerged as major factors in the structure of rates and charges. The principal determinant of the price of the transport service to the consumer is the local balance of supply and demand, and demand rather than supply, is the main influence. Seasonal factors affect both the demand and supply side of the market. As far as demand is concerned, much depends on the total crop output and the season of harvest. On the supply side, the seasonality of the climate reduces the number of roads open in the rainy season.

After all this discussion, the author still finds it extremely difficult to draw conclusions on the profitability of the industry. Relevant statistical data are hard to obtain especially for the inter-urban transport sector. Estimates in this particular situation are liable to be inaccurate, and the best that can be done is to present a real example which will be supplemented by careful observations. Table 13.4 represents the actual income and expenditure of a vehicle owner operating mainly in the Western Area.

TABLE 13.4 EXAMPLE OF VEHICLE INCOME AND EXPENDITURE (Jan-Dec. 1966)

1.	Revenue earned	Le 4360.00
2.	Overhead costs	Le 882.10
3.	Running Costs	Le 2092.10
	Total Annual Costs (2 + 3)	Le 2974.20
4.	Cross Annual Profit (1 - 4)	Le 1385.80

Evidence concerning profitability is scanty, but it is likely that many operators especially after the first year, enjoy a substantial margin of profit. Among these would fall poda-poda operators, taxi owners, freight hauliers and the recent private bus operators.

Hence there is no concrete evidence to support the railway's warning that road transport, especially the freight sector, is unprofitable; this may well represent a biased view aimed at prolonging the existence of the uneconomic government railway. A further complication is the impossibility of obtaining

a true figure of profits because of the complete lack of knowledge on depreciation. Since this is an important item, it can reduce the gross receipts of many operators to relatively small annual incomes. Under such conditions it is difficult to make estimates with any general validity. Much more detailed research is required before any reliable conclusions can be drawn as to the degree of profitability in the industry. This is a field where the government statistics department can be of tremendous use. However, a host of evidence points to the fact that commercial vehicle owners are among the wealthier classes of the population, though adequate statistical data do not yet exist to quantify precisely these qualitative impressions.

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CHAPTER 14

CONCLUSION

The study of transport, whether in developed or developing countries, can hardly be exhaustive. It is intricately interwoven with the entire development process that one can neither treat the several themes with a consistent degree of elaboration, nor even touch upon all the various manifestations of the inter-relationship between transport and general development. Thus roads and road transport have been accorded the greatest emphasis, because they undoubtedly provide today the most significant media in the growth process of the economy and society of Sierra Leone.

Sequent Development of Transport

A dominant theme prevading the entire thesis has been a constant effort to demonstrate the growth process of the transport network. Such an evolutionary process, as rightly stated by Taaffe et al. (1963) is "at once a continuous process of spatial diffusion and an irregular or sporadic process influenced by many specific economic, social or political forces".[1] Despite the superficial irregularity in the growth trend, it is possible to develop a generalized growth model synthesizing the broad patterns in the diffusion of internal transport lines over space and time. Taaffe attempted this using Gould's (1960) careful historical analysis of transport development in Ghana as an empirical basis for the construction of a realistic model.[2] Taaffe identified 4 stages of development and his conclusions have general validity for the Sierra Leone situation. However the Sierra Leone model identifies 5 stages and the implications of the pattern are more on the lines

of Hagerstand's diffusion wave theory, rather than a stage-by-stage evolution.[3] Since the central theme of the work revolves around the idea of inter-relationships, it is proposed to depart from treating the growth model as an isolate, and discuss it as an integral part of the whole process of economic growth and regional development. It must be emphasised that this approach is not intended as a causal explanation; it does not assert that transport has created the observed patterns of social and economic change, but wherever such a correlation is valid, it will be isolated and given detailed treatment.

Before the advent of European traders, what is today Sierra Leone consist entirely of an African population split into a number of political units which varied widely in size, but were fairly uniform in type of political organization, mores and economic structure. Every individual was a member of a kinship group and social control rested primarily with the head of the kin group, while political control was a function of a hierarchical establishement of chiefs. The economy consisted of simple subsistence farming, and each kin group exploited its holding for sustenance in ways analogous to every other unit of occupance. There was virtually no economic specialisation and no unit of occupance had an exclusive economic function. With a primitive technology, no surplus production was possible and consequently no substantial form of exchange developed. The kin group was the crucial social and economic unit and, at a higher level, was integrated into the bigger tribal unit through social and political organization. Society was essentially

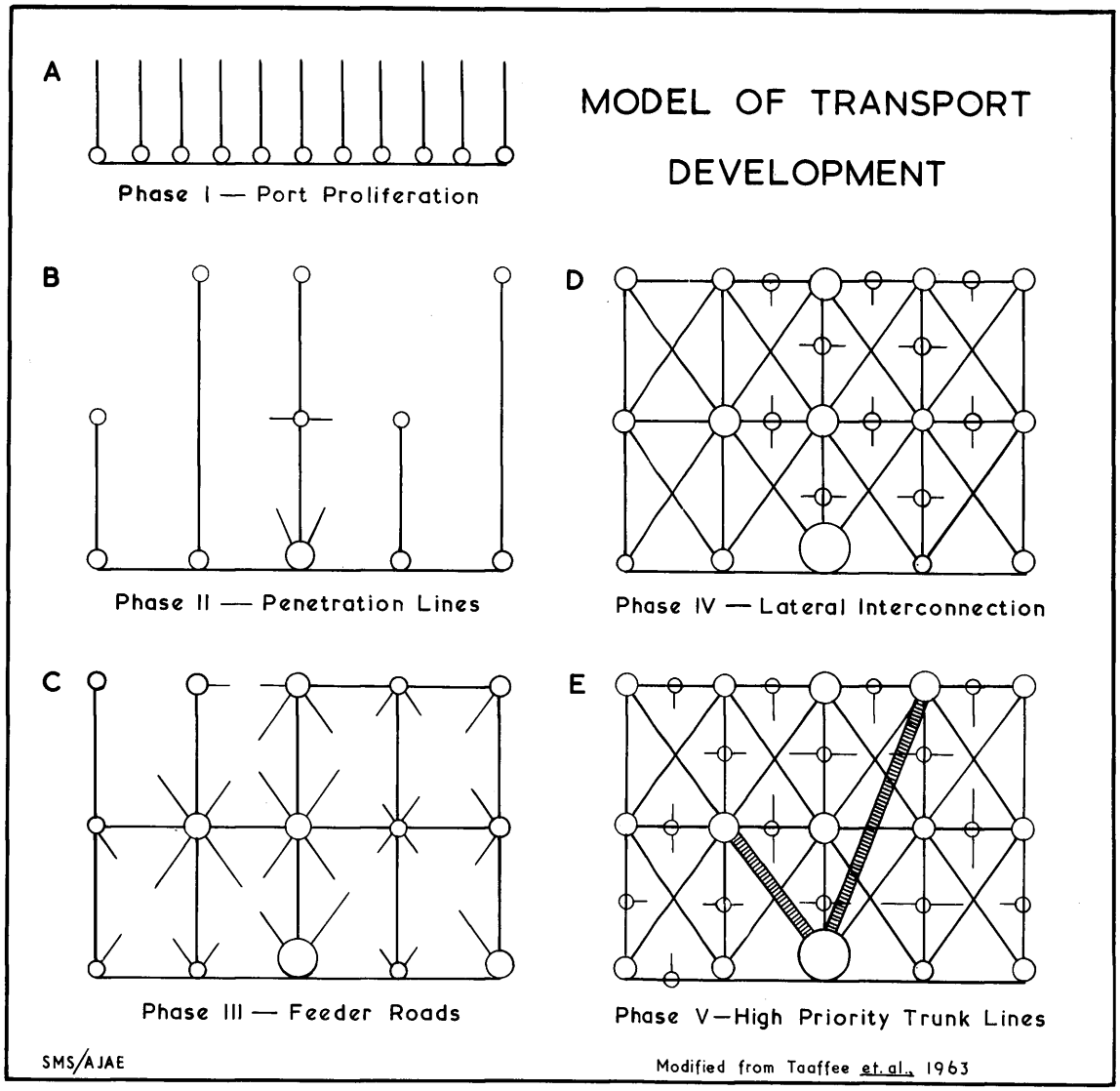
MODEL OF TRANSPORT DEVELOPMENT
A
Phase I — Port Proliferation
B
Phase II — Penetration Lines
C
Phase III — Feeder Roads
D
Phase IV — Lateral Interconnection
E
Phase V—High Priority Trunk Lines
SMS/AJAE
Modified from Taaffee et. al., 1963

Fig. 14. 1

static, because it was isolated from external contacts; methods of production remained traditional, social capillarity very minimal and technological innovations non-existent.[4] As would be expected, transport in such a social milieu was extremely rudimentary since its essential function, the creation of place utility for goods,[5] was absent. Expensive and time-consuming head porterage and canoes were the dominant transport modes. These were not economically efficient enough substantially to influence large-scale production and marketing. In fact at this stage one can hardly talk about a transport system; the real evolution of the transport complex and its sequent growth, started with the early contact of European traders with coastal Sierra Leone. It is at this crucial point that our model, shown in Fig. 14.1 starts to evolve.

Idealized Model of Transport Growth

Phase I. This period extended roughly from the 15th century to the last decade of the 19th century. The initial stage consisted of rudimentary shore installations with a preference for relatively small islands which were as defensible as a ship but unsinkable. Examples of such trading posts or "factories" include Bunce and York islands. With time, the limitations imposed by an island site resulted in the migration toward a larger and more secure shorebase, thus heralding the proliferation of small ports and trading posts along the coast as shown in Fig. 11 1-A. Each small port had a restricted hinterland, landward communications were poorly developed with circuitous bush paths connecting the centres with their hinterlands. The social and economic situation at this period reflected a limited amount of trade with emphasis on high value/weight ratio commodities. Gold and ivory

had a much broader trade hinterland then, say, timber. The society was still traditional, the indigenous population lived mainly in villages, though some had migrated to the European trading posts attracted by the more lucrative function of middlemen. Gradually a line of coastal urban settlements evolved with the heads of navigation acting as the effective interior limit. Port Loko, Magbile, Bonthe, Mano Salija and Sulima became important trading centres and break-of-bulk points in an economy that solidly depended on water transport, for the collection and distribution of trade goods. It is significant to note that none of these rivers developed as major penetration lines when effective European colonization began. Most of the early trading centres which they served have long since disappeared, destroyed by the emergence of the main ports, or else they persist as moribund ports, occasionally visited by the odd fishing trawler.

Phase II. This consisted of the emergence of a few major lines of penetration, the growth of inland trading centres, and the differential growth of terminal ports leading to port concentration and decline. This phase is identified in Sierra Leone with the emergence of the first railway line (SLGR) in 1896, the construction of the DELCO mineral railway (1933), and the development of the first trunk roads circa 1920. Three principal motives for building penetration lines have been active in the past: (1) The desire for effective administrative and military control; (2) the need to tap areas of potential agricultural export production; (3) the desire to reach areas of mineral exploitation. In these three cases, the economic motive was dominant, hence the government railway was specifically built to exploit the rich palm belt

of the east, while the DEICO mineral railway was intended solely for the exploitation of the Marampa iron-ore deposits. Political and military control resulting from European rivalry in Africa can be associated mainly with the construction of the Makeni - Kabala and Port Loko - Kambia roads, which were intended to ward off the French expansionist threat operating from their Conakry base.

These early penetration lines brought profound changes to the country. Primarily they provided a reliable and cheap transport mode for the commercial exploitation of natural resources, furnished a means for effective political control, and reoriented the spatial distribution of urban centres from the former coastal to a new inland pattern. The economy experienced its first major internal modification, with land and labour shifting from subsistence to commercial production, while the social homogeneity that once characterized the tribal communities started to show signs of disintegration. Finally, chiefs and heads of clans began to loose political control to the new administrators who represented the colonial presence in the country. The great significance of this phase lies in the fact that it marked the beginning of the transition process[6] whereby a society, once wholly agricultural with political organization built around relatively small and self-sufficient units, began to orientate its outlook towards commercial exchange, international trade, social heterogeneity, and a more complex centralized political authority.

Phase III. Penetration was followed by the evolution of feeder roads and incipient lateral interconnections (Fig. 14. 1-C), with a consequent maximization of exploitable areas, intensification of cash crop production and the greater

concentration of trade in the ports of Freetown, par excellence, and Bonthe. As would be expected, the roads developed mainly as complementary transport modes to the railway and helped in the establishment of intermediate trade centres. With appreciable rapidity, the two more efficient ports were connected with increasing effectiveness to virtually all parts of the territory, and as the popularity of flexible road transport became widespread, inland waterways and coastwise traffic diminished in importance. Even well-established river ports such as Port Loko in the 1930s, came to be served by lorries from landward rather than by sailing boats and launches. An interesting general feature in this phase is that, while the railway acted as the primary factor in the establishment of a money-oriented economy, roads, in the early stages, merely duplicated this function by channeling produce to rail collecting centres from areas not accessible to rail transport. Economic and social changes were still a function of the railway.

Phase IV. This really started in the post war period and, strictly speaking, represents the product of inter-modal competition whereby the railway, once the dominant transport mode, has been relegated to a poor second position. Roads have thus become the primary carriers of the nation's internal commerce, and it is in this context that their great significance lies. Road interconnectivity, linking virtually all the major towns is now fairly developed, only a few areas are still without road links. A series of high-density nodes have emerged and are already reaching out toward one another. By 1950 the major road gap separating the Western Area from the provinces is closed. On a national basis lateral interconnections are more developed in the cash crop zone of the south and east while in the north,

the process is still weak. Again we witness the concentration there being repeated as road transport increases the primacy of Freetown, and renders its hinterland for certain aspects of trade at least, coterminous with the political frontiers of Sierra Leone. Bonthe, a major challenger to Freetown still in 1900 has now succumbed, being visited only by a mere handful of ships to collect the Sherbro produce of piassava. The lorry has brought a greater linkage between the economy of rural and urban areas, helped to minimize the dichotomy between town and country, and facilitated the rapid mobility of persons both for trade and pleasure.

Phase V. This phase embraces several features: a fairly complete and coherent road network can be identified, the dominance of road over rail is now complete and in certain instances, incipient route substitution is evident as by-passes develop to provide more economical desire lines linking major urban centres.[7] High-priority trunk lines tend to develop again due to a process of further concentration; since the growth of the various centres shows a differential rate, with the result that a few interior centres and ports assert a geographic dominance over the entire country. For example the traffic lanes linking Freetown and Kenema, Freetown and Makeni, represent incipient high-priority trunk lines (Fig. 14. 1-3) with the best roads, the densest traffic and sometimes regular internal air services. The interesting feature about this phase is that it coincides with the period of take-off into sustained economic growth.[8] The impetus for this change can be traced to political independence in 1961 when economic thinking as outlined in the Ten Year Development Plan[9], was reoriented from an emphasis on raw material production for export to the creation of domestic industries both for

import substitution, and for export at a later stage. Hence this phase of transport development is geared mainly to meet the needs of an economy diversifying its internal structure, embarking on the road of industrialization, and creating a domestic market capable of absorbing the products of the new industries. The distributative function of transport is pre-eminen in this period, and this marks a clear break from the collective function of rail and roads between 1900 and 1960.

Critique and Further Consideration

The simple descriptive model that has been outlined raises many questions to which there are no immediate and easy answers. In some senses, the chronological sequence is unsatisfactory: this is inevitable because the development process is continuous, and while one phase is complete in one area, it has just started in another. For example, the cash crop zone of the east entered the feeder road stage (Phase III) circa 1920, while the Northern Province at the same time was just receiving its first penetration lines (Phase II). Even today, the emergence of high priority trunk lines goes hand in hand with the initial growth of the first feeder roads in some areas. Hence it is not possible to identify precisely the end of any one phase; transport development is progressing all the time at all the various stages.

The growth of modern transport has been identified rather exclusively with the desire to trade, but this desire has been present for several hundred years without generating any substantial transport innovation. Possibly extra-African rivalries between Britain and France were major factors that started the process. At a later stage, the desire for access to roads and motor transport on the part of the local population, acted as a spur in the

proliferation of 'minor' roads, hence a fairly strong correlation between road and population densities is evident today. Also one cannot ignore the personalities of administrators involved in the decision making level of transport. The early political influence of railway managers was reflected both in road gaps and government prohibitive legislation on road transport (1932, 1935 & 1937) to safeguard the financial interests of the railway. At the lower level, the obsession of some District Commissioners like W.Fenell Smith (1946-58) with roads, is reflected in the predominance of local authority roads in Koinadugu District where central government has only 100 miles of road. Today the political factor in transport development has become more prominent; the Pendembu-Daru tarmac surfaced road is purely the product of political pressure, while the reluctance to build roads in opposition areas is not merely a problem of money or difficult terrain. Hence many factors - economic, social, political and personal - have influenced and guided the growth process of transport in Sierra Leone.

Transport Policies

Economic reality has dictated and will continue to dictate that government participate actively in owning and operating some portions of the transport system. This is best achieved through public corporations charged with the duty of conducting their affairs on a commercial basis. Transport coordination must necessarily be encouraged so that each mode is geared to serve the traffic for which it is best adapted under existing circumstances, and should not seek to divert traffic from a competing mode better able to serve such traffic. The problem of coordination is essential to Sierra Leone which cannot afford to waste scarce investment funds in the mere

provision of excess transport capacity. Sierra Leone being fortunate in having a colonial experience that clearly demonstrated a great amount of control over transport policies, should carefully adopt a similar attitude to obtain the cooperation of the numerous small scale transport entrepreneurs, in the orderly development of a rational system. Over-expansion must be strenuously avoided, for once initiated, it creates social and political trends which are often irreversible to the point of economic hardship, as seen in the transport problems of some developed countries like Britain.

The problem of coordination

As in most developing countries, the emphasis in transport coordination lies on the investment sector; hence the system must be regarded as a whole and the investment needs of the various modes should be judged in this general context. Further, improvement of each mode has to take into account the possibility of expanding the entire system with the primary aim of moving goods and people at the lowest level of real cost. Among the most important issues are the establishment of priorities for investment and the controversial issue between road and rail transport.

With the elimination of the railway as already suggested, coordination now fully centres on roads, waterways and airways. A first major step would be the creation of a National Transport Corporation aimed at developing a consortium of public and private carriers. Such coordination would inevitably produce substantial economies, and render better services especially as the amounts now handled by each mode are relatively small in relation to the distances covered. The problem of investment must be based on the actual and potential traffic for each mode, and efforts should be directed at

developing each medium in the area where it is best suited.

There is an urgent need to formulate a highway-dominant transport plan that anticipates future traffic to be carried preponderantly by road transport. Roads should not only be improved and expanded to perform efficient both their present function and the future additional load of a dismantled railway, but steps must also be taken to ensure that such development does not hinder the growth of cheap water transport in areas where such a mode is best suited. The location of certain major urban centres and areas of production, (rice, piassava, bauxite and rutile) are such that water transport should represent a much more important component of the transport system than it does at present. It is particularly suited to serve the bulk producing areas of the lower Scarcies, Bullom and Sherbro. The emphasis should rest on traffic allocation, that will allow water transport to concentrate on bulk commodities, while trucks concentrate on the distribution of consumer goods and passengers in riverine areas.

The position of air transport is rather special since oftentimes its economic function tends to be subservient to its prestige value. Being a capital - intensive industry, its development should be geared to areas where demand is high. Political pressure aimed at the proliferation of uneconomic airstrips must be resisted at all cost. After all, air services do not now constitue pioneer transport lines, hence the need for a large number of inland airstrips is unjustifiable in a country where most settlements are already linked by some form of motor road. Further, a more critical attitude is required in providing air services for intermediate urban centres, with an apparent demand for such services. For example, the plan to link Yoyemba

immediately with the domestic air service is rather premature; such a link will only prolong the travelling time from Freetown to, say, Bo and would not materially influence cash flows unless fare reduction was such as to attract a lower income group of passengers. The case for further development lies mainly in improving the existing service especially by the provision of regular bus services between airstrip and town centre, the encouragement of the greater utilization of available capacity through an intensified programme of advertising, and the initiation of air freight services for meat and perishable foodstuffs from the Kabala area to large urban centres such as Freetown.

The Problem of Competition

The problem of competition among the various transport modes provides a constant theme throughout the study. From the earliest phase of development, competitive conflicts were reflected between roads and small water craft; canoe transport, head porterage, barrel-rolling and mules competed for the haulage of trade commodities from the interior producing areas to the coastal trading centres. With the coming of the railway (1896-1916) the anomalous situation of competition occurred, and mechanised rail transport virtually destroyed both canoe traffic and head porterage. The railway was more efficient in terms of speed and costs and logically became the country's main bulk carrier. These early forms of competition, though important when they occurred, were minor compared to the later rivalry between the railway and the roads. Originally the roads were a complementary form of transport to the railway, but in the 1930s they began to change their subservient role

and to actively compete traffic away from the railway. Such incipient competition was clearly evident on roads that give direct access to ports of exportation like the Makeni-Port Loko road, or on roads that paralleled the railway as in the Mano - Bumpe road.

The theme of competition will revolve mainly on rail and road roads since it is in this sector that inter-modal competition is most prominent. Waterways and airways are relatively insignificant and economically marginal to influence in any appreciable manner, the overall pattern of commodity movement. There is no doubt that some bulky low value traffic still goes by water transport in the lower Scarcies, Bullom and Sherbro areas, but this does not represent traffic diverted from any other transport mode. Rice, perishable foodstuffs and piassava either constitute residual traffic whose intrinsic value makes it uneconomic for lorry transport, or can only be carried by canoes because of the lack of alternative transport modes, as in the case of piassava in the swampy tidal creek area of Bonthe District. Domestic air transport is new and still in a rudimentary stage of development; it has therefore only succeeded in diverting very valuable traffic especially in the passenger sector, where the gains have been made largely at the expense of rail transport.

Rail-road competition is not a peculiarity of Sierra Leone, it is evident all over West Africa in varying degrees. Such competition has no doubt affected adversely the profitability of the railway, but to assess accurately the magnitude of this competition is difficult, because statistical data relating to the growth trend of road traffic is limited, and assumptions have to be made on estimates. Further the enormous post-war rise in road traffic does not entirely represent a net diversion from railway traffic,

in some instances, it represents new traffic or even feeder flows to the railway. From 1950 the railway has been registering a net loss in all traffic sectors, but the greatest decline has occurred in the "down traffic" export agricultural sector, formerly the mainstay of railway traffic. Road transport has successfully invaded the lucrative "up traffic" consisting mainly of import goods, and has made serious inroads into the passenger market. Further the problem of back-haul traffic for road hauliers has introduced a serious situation of rate reduction in the movement of produce to Freetown. Today, lorries, in order to avoid empty running, are increasingly performing the transportation of cash crops from the provinces to Freetown at ridiculously low rates. Table 14.1 conclusively indicates the trend for palm kernels, once the dominant commodity in rail "down traffic".

Several factors have contributed to the tremendous rise of road transport and the phenomenal decline in rail shipments. The predominance of bulk goods in the "down traffic" flow would, *a priori*, make the railway the users preferred mode of transport, but the railway serves only a small area. Further the greater volume of "up traffic" flow to meet the increasing demand for imported goods, is distributed mainly by road transport, whose flexibility is ideally adapted to meet the individual user's needs. Most important of all is the fact that the typical trade-transport combination, which has for long characterized the structure of internal commerce, is best served by commercial lorries. They can take the trader from one domestic market to another, carrying small consignments of goods, substituting passenger for freight or *vice-versa*, thus making it more adaptable to changing demand than rail transport could ever be. Avoidance of transloading is another advantage, especially

TABLE 14.1 PALM KERNEL MOVEMENT IN TONS - 1955-1965

Year	Export Total	Rail	Road
1955	57,640	12,206	45,434
1956	57,645	10,233	47,412
1957	52,967	8,867	44,100
1958/59	54,609	8,819	45,790
1959/60	57,530	6,533	50,997
1960/61	54,525	9,114	45,411
1961/62	57.764	11,864	45,900
1962/63	60,986	9,956	51,030
1963/64	52,787	7,306	45,481
1964/65	52,158	5,338	47,820

Source: Railway Annual Reports 1955-1965.

when handling facilities are poor with the consequent risk of pilfering and tampering with loads.

Direct price competition is also a crucial factor in the economic situation of the two modes. The factor, however is not important in passenger traffic. Rail 3rd class fares which are comparable to the ascertained road fares, tend to be generally lower, except in the short-distance journeys within the Western Area and along the main trunk road from Freetown to Bo, where road fares are appreciably lower. On roads not served by the railway, fares are invariably higher. The price factor alone would thus lead one to expect a greater proportion of the passenger market going to the railway, but this is not the case as seen in the decline of rail passenger volume from 1,352,620 in 1955 to 991,737 in 1965, representing a decrease of 26.8%. The

failure of the railway to show the expected upward trend is due largely to poor quality of service. The price factor finds its greatest application in freight rates, and to arrive at a realistic comparison, the railway class IV goods rate[10] has been chosen as a comparable rate to that of road transport. The class IV category represents the "middle rate"[11] and includes a variety of goods such as building materials, salt, fish, local furniture and timber, but excludes export agricultural produce. This middle rate is high compared to road freight charges as shown in Table 14.2 for a few selected routes.

TABLE 14.2 RAIL AND ROAD FREIGHT RATES 1966/67[12]

Journey	Mileage		Rate in Leones	
Freetown to:	Road	Rail	Lorry Load	Train Load
Magburaka	126	132	27.50	30.00
Bo	160	136	30.00	38.00
Kenema	230	182	45.00	48.00
Pendembu	277	228	52.50	58.00
Yonibana	71	101	25.00	29.00

Sources: S.A.J. Pratt in Development of Sierra Leone Railway 1966.
ITALCONSULT - UN Land Transportation Survey 1966
unpublished data.

The Problem of Safety

The fact of an increasing volume of traffic using larger, faster and heavier vehicles raises many problems prominent among which is that of safety especially in road transport. The road accident rate is increasing steeply with time not only in Sierra Leone but all over West Africa. The proverbial recklessness of lorry drivers has caused the number of road accidents to soar from 500 in 1950 to about 4326 in 1966,[13] often resulting in gruesome deaths. Although accidents are part of the social cost of transport, the cost need not be so high if a more rigorous policy of minimizing the causes of accidents is adopted. Since poor roads and mounting traffic congestion on main road arterials are major factors in the high accident rate, improvement upon the road system would thus seem to be a logical solution. Education and a prolonged period of tutelage among would-be-drivers, are considered prerequisites before any driving licences can be issued. The traffic police should be more rigorous in their driving tests and vehicles - especially commercial lorries - must be regularly examined to ascertain their roadworthiness. Laxity in these two respects will only lead to the unnecessary loss of life and wasteful damage to capital equipment. It is further suggested that illiterate drivers be encouraged through the Motor Drivers' Union to attend night schools, because a good number of accidents could be avoided if only these drivers were able to read road signs. Cooperat between the Ministry of Transport and Communication and the Police, is essential to ensure that roads are clearly marked and traffic regulations obeyed.

Inter-territorial Transport

Inter-territorial transport links are essential all over West Africa and governments have frequently reiterated the need for cooperation in this field. This idea is in fact of fairly recent development, as shown by past references to the comparative isolation in which the transport systems of the various territories have evolved, and to the distinct lck of inter-territorial links. These links however, constitute necessary prerequisites in the development of inter-African trade and economic cooperation.

In Sierra Leone, it would seem that only two modes, roads and airways, are of immediate significance. This may sound surprising since most other countries have usually stressed the role of railways in intra-regional transport integration, but the peculiarity of the SLGR makes it technically and financially unsuitable for connection with the standard-gauge Guinea railway. It is mainly in the field of roads that cooperation between Guinea, Liberia and Sierra Leone, all members of the proposed Free Trade Area,[14] is most pertinent. Government policy should aim at consolidating the economi usefulness of international trunk roads by linking them up with important territorial feeder road systems, so that they can serve both the needs of domestic and international trade. There should also be a harmonization of road building techniques, standardization of transport rules and regulation, agreement on simple road classification and highway numbering systems. With air transport, there is an immediate need for a complete re-evaluation of the economic rationale behind the present proliferation of small high-cost

national airlines. The lines of Guinea, Sierra Leone and Liberia should be merged into a single multi-national system capable of exploiting the advantages of economies of scale, and eliminating the existing "intensive competition among too many airlines serving too small a market".[15]

The trend towards bigger economic units in West Africa is gaining appreciable momentum, both the civilian and military governments are agreed on this vital issue as seen in the recent Accra meeting (May 1967) of nearly all West African countries, to discuss the possibility of a "West African Common Market". Such a meeting increasingly highlights the need for a closer examination of the role of transport in the present crucial stage of economic and social transition. Primarily, one must advocate active research into the individual transport problems of each state and the ultimate linking up of the various results. These should provide a realistic basis for the formulation of a Master Plan dealing with the entire transport complex Since all transport media are inter-related, their development in the West African region should also be coordinated, to produce a rational economic pattern that is fully adequate to serve all sectors of modernization. A critical factor in the materialization of regional cooperation is politics, but, with enough goodwill and an unrelenting effort to find acceptable solutions, progress is most likely to occur. There must be, above all, an earnest willingness to evolve new thoughts in economic planning and cooperation - thoughts in the context of a new and bigger region transcending the traditional frontiers of politics, society and economy.[16]

It is hoped that the problems raised in this conclusion and in the thesis as a whole, have to some extent indicated that the study of transport in economic and social development, can be both intellectually stimulating and fruitful as an essential planning tool in regional development. The fact that answers have not been found for some of the questions raised, does not negate the usefulness of the study in providing a challenge for further research. Finally, it is strongly believed that despite the many difficulties involved, the more transport studies in developing nations there are, the easier it will be to isolate some of the constantly recurring themes, and the ultimate formulation of general principles with a broad range of applicability in the developing nations of the world.

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11. Ibid. p. 271.

12. In Table 14.2 lorry load rates represent the average between private and hire purchase lorries, the former charge more while the latter charge less for reasons already advanced in Chapter 13. Train load refers to its lorry load equivalent.

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15. Ibid. p. 2-3.

16. Ibid. p. 5.

APPENDIX A

TOTAL VEHICLE PARK - Sierra Leone 1966

Vehicle Type	Freetown	Kenema	Sefadu	Bo	Makeni
Cars	3,002	418	445	425	273
Light Vans	1,399	164	101	212	101
Taxis	419	21	84	70	-
Lorries	800	166	130	246	188
Buses	524	32	16	36	13
Govt. Vehicles					
Cars	600	100	2	20	20
Light Vans	279	28	-	8	4
Lorries	300	18	-	15	23
Buses	289	-	-	-	-
Total	7,612	947	778	1032	622

Regional Composition	No.	% Age	Vehicle Composition	No.	% Age
Freetown	7612	69.2	Cars	5303	48.2
Kenema	947	8.6	Light Vans	2296	20.9
Kono	778	7.1	Lorries	1888	17.2
Bo	1032	9.4	Buses	910	8.3
Makeni	622	5.7	Taxis	594	5.4
Total	10,991	100.0		10,991	100.0

NOTES:

(i) The grand total of 10,991 vehicles excludes motor cycles, tractors, trailers and mining vehicles.

(ii) The grand total of 10,991 vehicles represent only those that have been licensed for the period. There is a small percentage of vehicles that evades licensing. The total of these may be 1% of the vehicle park, which gives a grand total estimate of 12,000 vehicles in operation.

(iii) All vehicles in the Western Area are registered in Freetown.
Vehicles in Kono District are registered in Sefadu.
Vehicles in Kenema and Kailahun Districts are registered in Kenema.
All vehicles in the Southern Province are registered in Bo.
Vehicles in the Northern Province are registered in Makeni.

APPENDIX B

AGE STRUCTURE OF VEHICLE PARK 1966

Year of Registration	Cars		Buses		Light Vans		Lorries	
	No.	% Age	No.	% Age	No.	% Age	No.	% Age
1958	5	2.8	-	-	3	5.4	3	4.0
1959	4	2.3	-	-	-	-	4	5.2
1960	5	2.8	-	-	2	3.6	8	10.4
1961	14	7.9	-	-	3	5.4	7	9.0
1962	14	7.9	-	-	3	5.4	6	7.9
1963	31	17.5	1	11.1	13	23.7	14	18.1
1964	43	24.3	3	33.3	16	29.1	20	26.0
1965/66	61	34.5	5	55.5	15	27.4	15	19.4
Total	177	100.0	9	100.0	55	100.0	77	100.0

Year of Registration	All Vehicles	
	No.	% Age
1958	11	3.7
1959	8	2.5
1960	15	4.7
1961	24	7.5
1962	23	7.2
1963	59	18.2
1964	84	25.4
1965/66	94	29.8
Total	318	100.0

NOTES

Every vehicle passing through the Census Point at Mile Post 47 on the Freetown-Provinces road, is stopped and checked. The driver is asked for the age of the vehicle, his answer is tabulated against the vehicle's registration number. These figures are later rechecked at the Police Licensing office, Freetown, by inspecting the vehicle's registration card. There was a good correlation between the two sets of data. Of the 318 drivers interviewed, 39 did not know the vehicle's age; 82 had estimates that varied by over 1 year, and 197 had accurate estimates.

(Data on Appendix A and B are based on work done by Mr. R. Martinez of IPALCO/SWAF and the author).

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A B S T R A C T

Transport in Relation to Social and Economic Development in Sierra Leone

Thesis submitted to the University of Durham for the Degree of Doctor of Philosophy, 1967

by

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In Sierra Leone today, land, water and air transport are manifested in the whole range of traditional and modern economic activities. Their evolution and present distribution, especially roads, reflect not only regional variations in development, but are also associated with other geographical phenomena such as settlement, resource utilization and employment.

The basic motive in developing the transport system, was to link areas of potential agricultural and mineral production to world markets. The railway (S.L.G.R.) accomplished the earlier phases of the linking process, especially in the oil-palm region of the south and east. It was thus the initial factor in the effective introduction of a cash economy, development of towns, and the wider distribution of consumer goods.

Roads and road transport were originally intended as feeders to the railway. However, their flexibility and adaptability to changing needs quickly made them formidable competitors of the narrow-gauge railway. Progressively, they have become the principal transport arteries through which the bulk of internal trade goods is transmitted.

Their functions pervade the entire society and facilitate the greater diffusion of modern innovations, as well as the creation of wider economic, social and political horizons. Internal air transport, still in the formative stage, is yet only of marginal significance due to low effective demand and high costs.

Future transport policies should aim at a rational co-ordination of the entire transport system, so as to meet the needs of industrialization and modernization. The railway, which can no longer contribute to national development, should be phased-out, and its load transferred to road transport. Co-ordination of road, water and air transport, must ensure that each mode is geared to serve the traffic for which it is best suited. This involves the careful planning of transport development in relation to the economic, social and political geography of each area.