LENGTH OF JOURNEY AND CHOICE OF MODE OF TRAVEL TO WORK - A CASE STUDY OF DAR-ES-SALAAM CITY.

by

AYOOB R. OMARI, B.SC (HONS)

A THESIS SUBMITTED IN PARTIAL FULFILMENT OF REQUIREMENTS FOR THE DEGREE OF MASTER OF ARTS (PLANNING) OF THE UNIVERSITY OF NAIROBI

JUNE, 1976

THIS THESIS HAS BEEN SUBMITTED FOR EXAMINATION

WITH.....

APPROVAL AS UNIVERSITY SUPERVISOR

ACKNOWLEDGEMENTS

The successful completion of this thesis was a result of co-operation and generous assistance of many individuals, all of whom I sincerely wish to acknowledge.

I wish to acknowledge the assistance, direction and supervision given by my University supervisor Mr. S. Saha, lecturer in the Department of Urban and Regional Planning who continued to review and check my work up to the time it was published.

I also wish to acknowledge the encouragement advice and supervision given by Professor A. Subbakrishniah, Chairman of the Department of

Urban and Regional Planning, University of Nairobi. Further thanks are extended to Mr. Z. Maleche also a lecturer in the department for his assistance and advice. I also thank Mr. S.L. Mlipokea of Ardhi Institute whom we discussed together at length problems of Urban Development in Tanzania.

My thanks go to the Director General of Capital Development Authority Dodoma, Mr.C.C. Kahama who authorised my sponsordhip in M.A. (planning) at the University of Nairobi and who allowed me to use all necessary facilities on the Dar-es-Salaam office of the Capital Development Authority, when I was carrying on the survey.

Also sincere thanks should go to Mr. F. Shayo, Director of Physical and Social Planning Capital Development Authority who in addition to having recommended me for this course, he constantly advised

and encouraged me to specialise in Transporation and Traffic Planning.

I want to thank also officials of the United Nations Development Programme particularly Mr. R. Whitecome who initiated and processed thetransfer of my sponsorship from Tanzania Government to U.N.D.P. for the last 9 months of my course.

I am sincerely indepted to Mr. Christopher Ndamagi the system Analyst with the East African Railways Headquarters, Nairobi, who assisted me in preparing the computer programme which processed the data. The analysis of the data from the questionnaires was extremely simplified by his contribution.

I wish to thank Mrs. Mary Odallo of Otis Elevator Company, Nairobi, who worked day and night in order to have the work typed in time.

Lastly I am very thankful to my beloved wife - Farida to whom I am dedicated, who left away her duties in order to come and stay with me while I was writing this work. The many ways she helped me have contributed to the success of this work.

A B S T R A C T

Journey to work is the major aspect in transportation planning in Urban areas since all major transportation and traffic problems occur during peak periods. These problems namely delays congestion and accidents, affects workers' efficiency and productivity. They therefore have a negative contribution to National Development.

This study was concerned with characteristics of journey to work in the City of Dar-es-Salaam. More specifically it was concerned with the relationship between the choice of mode of travel and length of journey to work. Factors of choice of mode of travel are numerous. Few of these are length of journey, income, sex, family size, nature of job and number of people employed in the household. Some of these have been looked at together with length of journey.

Various findings and problems have been identified concerning problems associated with usage of each of the following modes:- Walking, bicycle, motorcycle, Public bus transport, private car and office transport. Other problems have been identified concerning present lengths of journey to work, land use, urban structure, road facilities and government policy on urban development.

Recommendations have been given to offset the problems identified. More specifically the recommendations have been given on the rationale of usage and planning for each mode, and

cordinations between them wherever possible. Parallel to this are recommendations concerning improvements on the present road facilities on the major roads, to facilitate usage for various modes of travel.

Some suggestions concerning location of employment centres and residential areas are also given.

Lastly the author recommends policy changes in housing allocations to workers, and on administrative set up in the office of the Regional Development Director or Zonal Town Planner, Dar-es-Salaam.

TABLE OF CONTENTS

12. Peak Period Traffic Volume for Major Roads (1976) p.c.e.

13. Design Capacity of the Roads

14. Population and Employment per Zone - 1973

15.A Central Business District:-

Residents at Various Distances from Centre of Work

15.B Ubungo Industrial Area:-

Residents at Various Distances from Centre of Work.

16.C Pugu Road Industrial Area:-

Residents at Various Distances from Centre of Work

15.D All workers Interviewed:-

Residents at Various Distances from Centre of Work

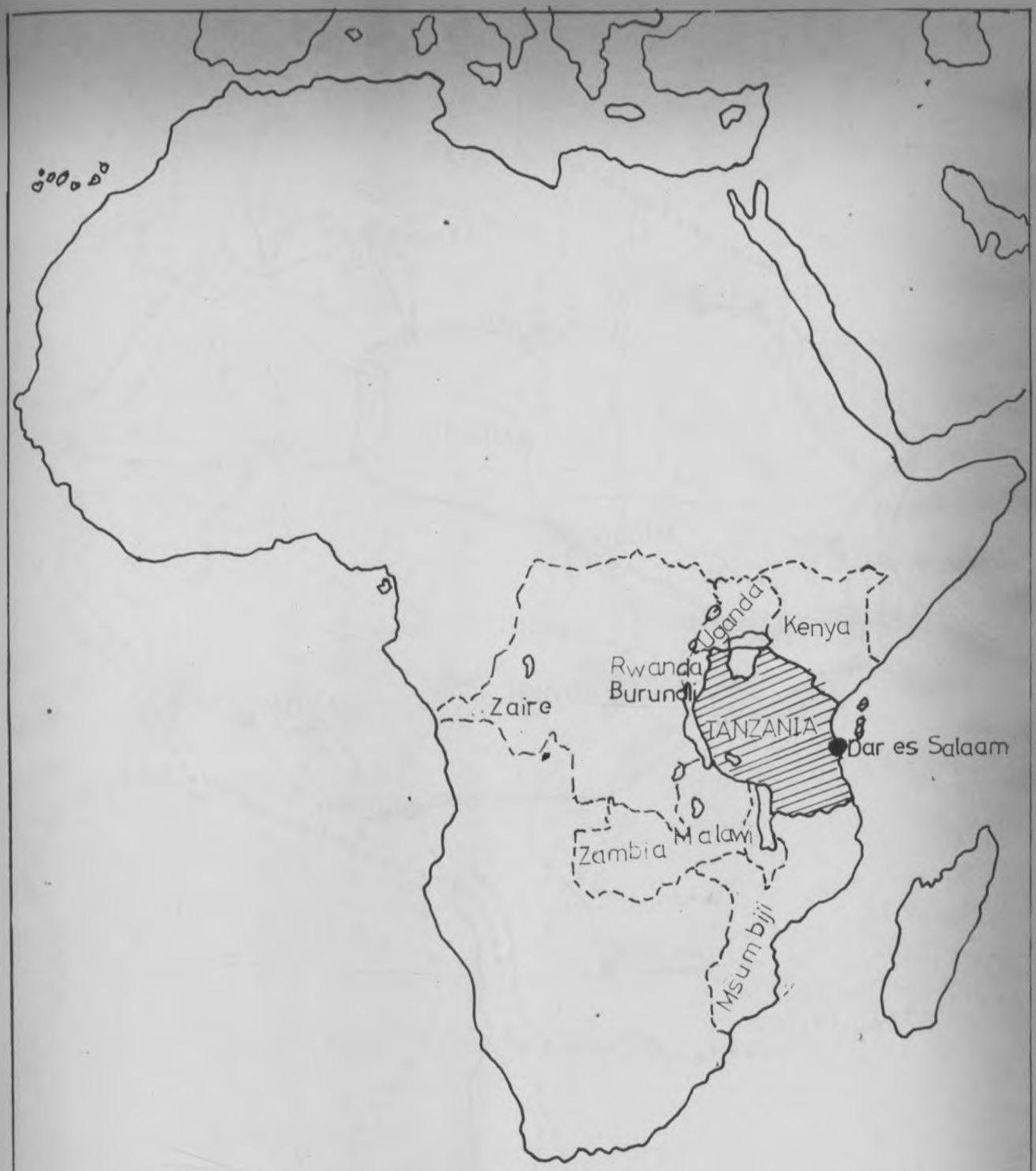
16. Secondary School Pupils:-

Number of Pupils Staying at Various Distances from the School

LIST OF TABLES

LIST OF MAPS

LIST OF PLATES



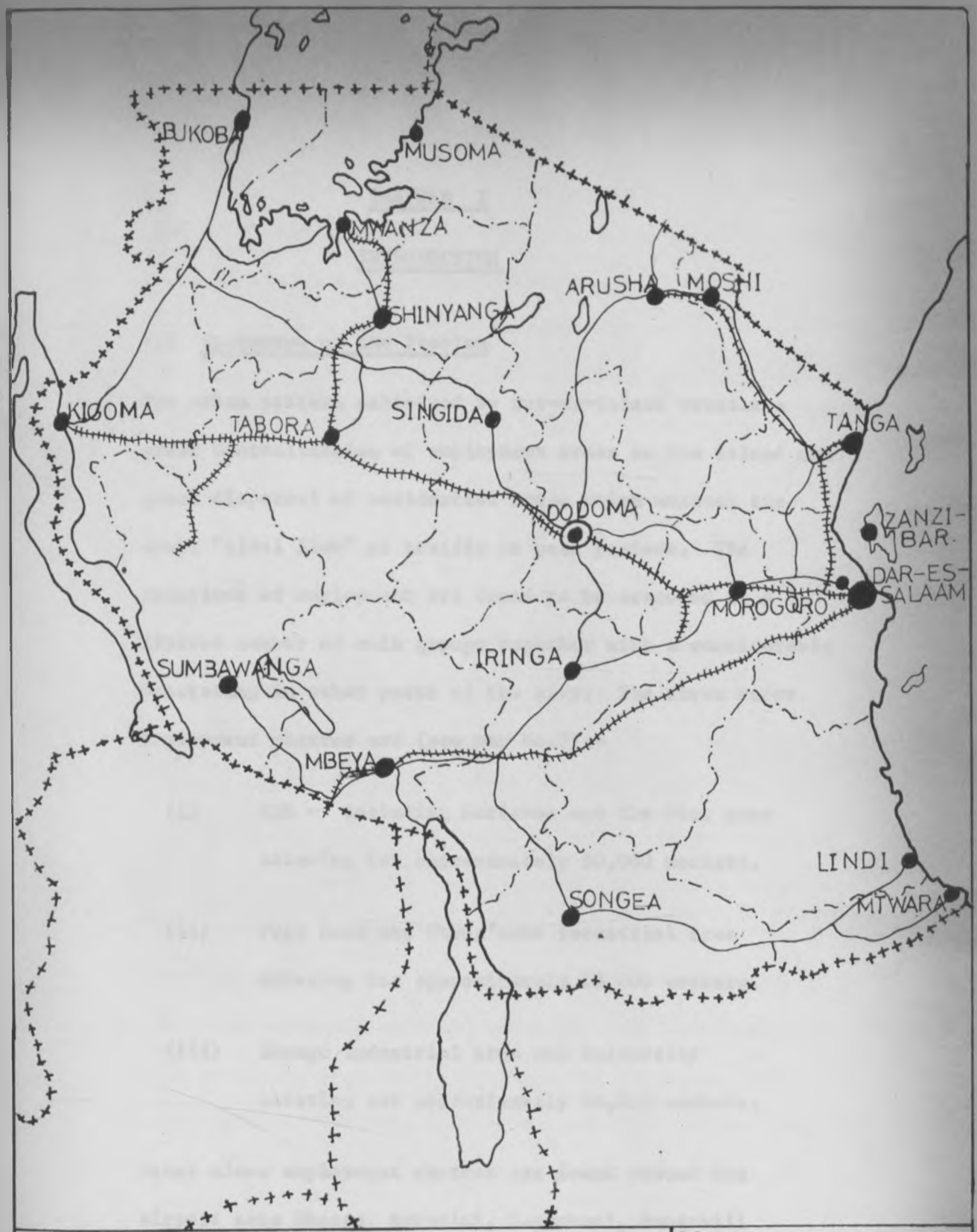
DAR ES SALAAM
African Setting.

SCALE:
0 600 1600 Km

LEGEND.

A.R.Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76.

1.



DAR ES SALAAM.
National Setting.

SCALE:
0 100 200 300 Km

LEGEND

- International Boundary.
- Major Roads.
- Regional Boundary.
- Regional Headquarter.
- Railways.

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76.

2.

CHAPTER I

INTRODUCTION

1.1 Statement of the Problem

The urban pattern exhibited by Dar-es-Salaam reveals a great Centralisation of employment areas on the island and great dispersal of residential areas which worsens the acute "tidal flow" of traffic at peak periods. The locations of employment are found to be arranged in a limited number of main groups together with a considerable scattering in other parts of the city. The three major employment centres are (see map No.7):-

(i) CBD - including Kariakoo and the Port area catering for approximately 50,000 workers.

(ii) Pugu Road and Chang'ombe industrial area catering for approximately 23,000 workers.

(iii) Ubungo Industrial area and University catering for approximately 10,000 workers.

Other minor employment centres are found around the airport area Uhonga, Kurasini, Kagamboni, Muhimbili Hospital and Ilala.

The residential areas of Dar-es-Salaam apart from the Central area, Kariakoo and Ubungo are found further in the periphery particularly the new sprawling areas of

Kijitonyama, Ubungo, Mikocheni, Tandika, Kimala, and Tembeke. Appendix No. II shows distances in kilometres of residential areas from the major employment centres. Also map No.11 shows the map of Dar-es-Salaam in land use zones. For each zone there is indicated the number of people residing there and the number of people employed there.

The pattern of travel to work has been becoming more complicated in Dar-es-Salaam over the last few years. As the city has grown, new dwellings have been constructed in the periphery because no other locations were so readily available. The occupants of these new dwellings however have been mainly dependant for employment upon the established work centres. Also in the replacement of slums as a reaction against the crowded living conditions found in the older parts of the city, the new houses have sprawled in the sub-urban estates. This dispersal has brought about better living conditions for thousands of people but the benefits are now tending to be offset by the increasing difficult travelling conditions which the dispersal has brought about. Difficult travelling conditions means that the lengths of journeys to work have constantly increased such that travel costs have automatically increased. This is supported by the fact that workers' incomes has not increased according to the increase in lengths of journeys to work so that one finds some people with very high incomes staying very close to their employment centres while some people with very low incomes are found staying very far away

from their employment centres. It is from such irregularities that people's choice of mode of travel to work is of importance in planning since some workers may be found to use modes which they are not expected to use.

Modes of travel to work in Dar-es-Salaam are:- walking, bicycles, moto-cycles, public bus transport and office transport.

People who use private cars to work are limited by low levels of private automobile ownership which is a result of low levels of per capita income and the government's limitation on importation of private cars in order to save foriga exchange. Other factors affecting the usage of private cars are severe degrees of congestion, which raise operating costs and also personal time and discomfort; and rising prices of petrol.

Motorcyclists, in addition to the already mentioned factors for private car users, are faced with risks of accidents on the narrow roads of the central area of Dar-es-Salaam.

The fact that a large part of the population of the poorer cities like Dar-es-Salaam cannot afford motorised transport to a large extent underlines the seriousness of increasing facilities for pedestrians and cyclists. This

might encourage the people in Dar-es-Salaam to use these cheapest modes of travel to work. However bicycles are some of the rarely used means of travel to work in the city because there are no adequate facilities provided for this, particularly in the Central Business District where there is a great confusion of traffic. On the other hand there is a substantial number of people who walk to work not because there are reasonable facilities for this but because people are close to their employment centres or simply because they cannot spare any amount of money for transport form their meagre incomes. Generally the city lacks facilities for pedestrians and cyclists. There are no side walks and no separate tracks for cyclists.

A large percentage of workers use public transport not because it is the cheapest but simply because it is the one which the majority of the people can afford, though looking at it from an international standards' point of view the Dar-es-Salaam public bus transport system is one of the poorest and the majority of passengers look completely dissatisfied of the services offered. So in general the mass transport is inadequate bot in levels of services and in the areas served. This is a result of mainly an acute shortage of resources so that there is not only insufficient supply of the required number of buses but also the inadequate supply of spare parts, such that there are constant breakdowns which disrupt the scheduling of buses every morning.

Because of poor management of traffic controls in the city and the narrowness of the streets in the central area and Kariakoo there is a severe degree of congestion which automatically affects the movement of buses and thus causes delays. This also affects the scheduling of buses even if the buses were enough.

Another aspect connected with public bus transport is that strictly speaking there is minimum cooperation between public bus transport management officials and the urban planners such that the public bus transport Company (UDA) uses the roads which it has no control of.

Finally since the government of Tanzania decided to take over the mass transport (formerly called DMT) there has not been any organised training programme such that some of the problems we can see are a result of shear ignorance of the drivers, conductors and inspectors in their respective jobs. There is a hope that this problem might be solved since there is presently "THE NATIONAL INSTITUTE OF TRANSPORT" which is involved in training students in transportation management and planning. First enrolment was in 1975.

Free office transport is enjoyed by those who are entitled. These are senior government officers and all workers in productive parastatal organisations. There might be some ill feeling among those workers who do not enjoy free transport.

1.2 Significance of the Problem

Efficiency at work is a result of, among other things, good health of the workers. Fresh and healthy workers arriving in their offices every morning will work efficiently on their respective responsibilities. The result of this will be high productivity and thus rapid development of the nation will take place. Also coming to office late reduces the working

hours of the workers, as such productivity is likely to be lowered. Therefore to ensure that workers travel comfortably with suitable modes; and arrive on time at their places of work, is among the major stimulants of productivity and thus increases development of a Nation. This argument has led some employers to provide either houses near the offices of their employees or transport for the employees.

One interesting aspect in Dar-es-Salaam is, since the Public Bus Transport has been proved to be quite inefficient by almost everybody in the city then most employees particularly those who are irresponsible take it as an excuse of being late at work even if the mode of travel used by a particular worker is not the Public Bus Transport.

Some aspects of lateness, inefficiency and lower productivity[1] have been noted in many employment sectors in Dar-es-Salaam. Though we know that there are many arguments which can be put up to explain this, still the question of convenience of the workers in travelling to work cannot be ignored.

---

1. As a reaction towards inefficiency and low productivity the government of Tanzania has reduced the number of employees in the Civil Service by 20% in March 1976.

Many employers pay their workers for only the time they spend on the jobs they are employed to do. However the free time which the worker uses to travel to work should never be overlooked. This is important because different workers under the same employer are likely to stay at different distances from their employment centre. Further, they are likely to have different incomes. This being the case workers are likely to use different modes of travel to work. Each of these modes requires different facilities.

When the government of Tanzania put a limit on the number of private cars imported in 1973, it had in mind that people who are expected to use private cars as a means to travel to work, would use Public Bus Transport and other modes. However efforts to improve public bus transport have remained unsuccessful. In fact there are cases where UDA has resorted to buying more buses in order to increase the efficiency when the problem was partly that of road design and workers training.[2] Realistically, there is a limit to which the Public Bus Transport can work efficiently particularly when there is minimal improvement on the urban structure while there is increasing urban and population growth.

---

2. MTC paper on causes of traffic congestion, 1974.

Bicycle usage in Dar-es-Salaam seems to have been initiated. There is a bicycle factory being built in Dar-es-Salaam at Mwenge on Bagamoyo Road. The factory is expected to produce about 150,000 bicycles a year starting from 1976[3]. Further, the government issues loans to workers to purchase bicycles. This will not mean much if the roads have minimum bicycle facilities. There are few workers who are ready to risk their lives for the sake of being on time in the office.

People using free office transport have always been considered as those being favoured. This question became very serious in 1974 when the workers in Government ministries who do not enjoy free office transport questioned why in a socialist country certain workers were transported free while others paid for their transportation to work. This question is of crucial importance in a country like Tanzania where most of the employment institutions are owned by the state. But there remains an even serious question to answer. Can Tanzania afford free transport to all workers?

---

3. Daily News of August 7, 1975.

1.3 Purpose of Study

This study has been carried out in order to see how the choice of mode of travel to work by the workers is related to journey length and the effects of this relationship to the workers' ability, fitness and productivity on the job.

Factors of choice of mode of travel to work are numerous. Some of these will be looked at in line with length of journey. So the objectives in this study are:

(1) To get a clear understanding of the use of each of the modes of travel to work, and note planning implications as related to length of journeys and workers ability.

(2) To provide for efficient accessibility between major employment centres and major residential areas at peak periods by suitable modes of travel.

(3) Give the rationale for the use of each of the modes of travel to work.

(4) To obtain maximum and efficient use of the major road system at peak periods.

1.4 Scope

The scope of this study covers the peak period traffic and other related aspects, and the consequence of this in planning.

After the general introduction in Chapter I there is the background analysis in Chapter II. This is to let those who do not know the nature of Dar-es-Salaam have a clear understanding of it. This chapter will discuss National and Regional setting, physical characteristic, Historical Development concerning the functional and structural pattern, population and Economic activities.

Chapter III deals with the Travel characteristics of the city. Concentration is geared to the peak period travel characteristics. Issues under discussion here are journey purpose, Traffic Volumes, Travel Demand and Length of journey.

Chapter IV considers the various modes of travel to work in terms of the existing situation, future projections, travel costs in terms of money and time, space utilisation and the relation between lengths of journey and incomes. Also, convenience and safety are considered for each mode. The modes which are discussed are walking, bicycle, motor-cycle, public bus transport, private car and office transport.

The other aspect dealt with in this chapter is the existing road facilities on major roads and how they conform with the modes of travel. (See also Appendix VI and VII).

Chapter V is a summary of findings and problems identified. It is from this summary that recommendations and proposals are made in Chapter VI.

Chapter VIII is the conclusion.

1.5 Assumptions

(1) Journey to work in this study is viewed as the journey made by a person from his home place to his employment area and vice versa daily at particular hours in the morning and evening. Thus it is peak hour journeys which for Dar-es-Salaam includes journeys made by employees in both the formal and informal sector plus journeys made by school children.

(2) The working hours in Dar-es-Salaam are distributed as follows:-

(i)	Government Ministries	- 7.30 a.m. - 2.30 p.m.
(ii)	Parastatal Organisations	- 8.00 a.m. - 3.00 p.m.
(iii)	Special Parastatal Organisations e.g. Banks	- 8.00 a.m. -12.30 p.m. - 2.00 p.m. - 4.30 p.m.
(iv)	Private Organisations	- 8.00 a.m. -12.30 p.m. - 2.00 p.m. - 4.30 p.m.
(v)	Schools	- 7.30 a.m. - 1.30 p.m.

From the above distribution of working hours the peak periods in Dar-es-Salaam are between 7.00 a.m. and 8.00 a.m. in the morning and between 12.30 p.m. and 3.30 p.m. in the evening. The afternoon peak period, however, is more distributed and is not as critical as the morning peak period.

(3) Journey to work is assumed to be about 50% of all journeys made during the day (40% for work and 10% for school).

(4) There will be a low level increase of car ownership in future.This isin accordance with the government policy in discouraging private car ownership.

(5) There is and there will still be an increasing number of people willing to use public bus because other alternatives of travel are very limited. But presently the Dar-es-Salaam public transport is inefficient.

(6) The maximum distances which workers are willing to travel with modes are assumed as shown below.

Private Car	-	20 Kilometres
Office Transport	-	Any distance since it is free
Public Bus	-	16 Kilometres
Cycling	-	7 Kilometres
Walking	-	3 Kilometres

(7) Though by 1980 40% of workers in Ministries will have shifted to Dodoma this will not necessarily have much effect on the growth of Dar-es-Salaam since Ministries' workers are a little over 10,000 as compared to about 90,000 workers in other sectors[4].

1.6 Government Policy on Urban Transportation:

The government of Tanzania does not have an urban Transportation policy as such; however, various aspects in the overall policies of the nation seem to have effect on urban transportation planning. Some of these aspects are:

(i) Private bus companies are discouraged to operate in the urban areas[5].

(ii) Limit on importation of private cars and spare, parts plus control on petrol consumption have limited private car ownership. The growth rate of car ownership has decreased tremendously.

(iii) Issuing of loans to workers by the government to purchase bicycles is one way of encouraging people to use cheap modes of travel to work instead of expensive motorised modes.

---

4. Information from Capital Development Authority Dodoma.

5. Nationalisation of DMT is seen as an example to support this statement.

(iv) Shift of Capital to Dodoma has hit on infrastructural services in Dar-es-Salaam A lot of projects earmarked for development have not yet been implemented because a lot of funds are diverted to develop Dodoma.[6]

(v) Decentralisation of Coast Region into two regions (Dar-es-Salaam and Coast) has created imbalance in project implementation which were under the coast region[7].

(vi) Abolition of City Council has affected very much the funding system of the city administration. There is a general decrease in money making institutions in the city[8].

(vii) Present Government Policy on rural development is not sympathetic with urban development. For example in Dar-es-Salaam funds for provision of new roads in urban areas except Kariakoo, for the last 2 years were nil. While areas classified as rural but within Dar-es-Salaam region e.g. Msongola are continuously getting funds[9]

---

6. Information from Zonal Town Planners - Coast and Dar-es-Salaam - 1975.
7. Ibid
8. Ibid
9. Ibid

1.7 Review of Previous Studies:

There has been no study carried out in Dar-es-Salaam to see the implication of choice of mode of travel to work and length of journey. The few studies carried out were concerned with either the overal urban development, or operation of the public bus transport in the city. Most of these will be referred to here and there in the text and indicated in both the footnotes and bibliography.

Studies concerning the operation of the city Public Bus Transport have overlooked the fact that proper Public Bus Transport requires a thorough understanding of other modes of travel in order to determine how far Public Bus Transport can be improved in relation with other modes of travel.

The author in this study tries to look at each mode of travel, and determines the rationale of planning for each mode by studying the urban structure and the present major locations of both residential areas and employment centres.

The author first analyses the travel characteristics at peak periods then determines the present choice of mode of travel to work and compares this with any previous results and then notes the variations for each mode. He further relates the choice of mode of travel to work to incomes and lengths

of journey. From this he observes the present road facilities whether they are adequate for the modes of travel to work.

Recommendations are given concerning:

(i) Location of residential and employment centres.

(ii) Planning for each of the modes of trave to work.

(iii) Improvement on the existing major roads which connect the major employment and residential areas.

1.5 Methodology:

This study was conducted between 15th July, 1975 and 6th October, 1975, during the long vacation following the 1974/75 academic year.

All the information and data gathered has depended very much on the capabilities of, and availability of relevant means to the author.

The major instrument for gathering information was the Questionnaire (see Appendix I). The questionnaire was designed so as to get information from the employees concerning:- place of residence, place of work, time taken for the journey, mode of travel to work, sex, occupation, income, family structure, ownership of mode (Private car, bicycle, motorcycle) and problems associated with the particular mode used.

The questionnaires were distributed in selected major employment areas. (Table No. 1) shows the major employment centres, approximate numbers of workers in each, number of questionnaires distributed and numbers of questionnaires received from each centre.

TABLE NO. 1 - SURVEY PROCEDURE

	Name of Employment Centre	Approximate No. of Employees	No. of Questionnaire Distributed	Number of Respondents
1.	Central Area	30,000	1,300	1,208
2.	Pugu Road/ Changombe Industrial Area	23,000	1,400	248
3.	Ubungo Industrial Area	10,000	1,300	944
	Total	83,000	4,300	2,400

The total number of employees who responded were 2,400. This is only about 3% of the employees in major employment centres. However, as it can be seen in Table I it was the intention of the author to bring that figure to about 6%. The sample of 3% is small to give reliable results but since the collection of employees was done randomly the result obtained somehow depicts a more or less true picture of the situation. Time, money and personnel

were very limited to enable a bigger sample to be sampled out. It should be appreciated that sometimes it is necessary to work within given limits.

In order to know the travel characteristics of pupils, two primary schools and one secondary school were selected for survey. The secondary school surveyed (Tambaya Secondary School) had about 1,000 students.[10] Every student was required to indicate against his/her name his/her place of residence and the means used to travel to school. In collaboration with the school administration 768 pupils responded. This was tabulated to determine the choice of mode of travel to school and the distances from their homes to school.

The survey made in two of the primary schools established that more than 75% of the pupils stayed within the neighbourhood of the schools so the journeys made by primary school pupils were not included in the analysis.

Owing to the tidious job involved in analysing the data from the questionnaires, data processing was done by the computer. The results from the computer are on the Computer Sheets and shown on Appendix VIII to XIV.

---

10. Most secondary schools are within the central area of the city.

Further information concerning travel characteristics in the city were obtained from the records of the previous studies. Useful documents in this respect were:

(1) The Dar-es-Salaam master Plan - 1968

(2) Bus Transport for Site and Service Areas Dar-es-Salaam, by Cowiconsult - July, 1973.

(3) NTC (National Transport Corporation) paper on causes of traffic jam in Dar-es-Salaam, and consequent long and short term proposals, January, 1974.

Some information on UDA (Usafiri Dar-es-Salaam) were obtained through regular visits made to the UDA headquarters, Kurasini Depot by the author. Any extra information on UDA was obtained from observations made in the central area during the time of study. And, also information was obtained from published reports which are shown in the bibliography.

Various statistics were obtained from the National Statistical Bureau, Ministry of Lands Housing and Urban Development, Office of the Zonal Town Planners of Coast and Dar-es-Salaam Regions and The Capital Development Authority Dodoma.

1.9 Limitations of the Study

1. Because of limited time (15th July, 1975 to 6th October, 1975) and limited funds for transport and employing personnel for such a vast study to be carried out, the sample of the people interviewed is rather small and some extra information has been obtained from the written text as shown in the footnotes here and there.

2. It was not possible to conduct a house to house survey owing to the large area that was to be covered.

3. Few models have been used in the analysis because of their limited practical applicabilities.

4. In some cases where up to date information could not be obtained, information for the past years was used for convenience.

5. It was the intention of the author to have photographs displayed wherever found necessary. However efforts to seek permission from the Regional Commissioner to take photographs on relevant issues were unsuccessful. So the author had to do with the few photographs he could get from other sources.

6. All projection and recommendations have been put up to 1990 so as to match with the recommendations given in the master plan of Dar-es-Salaam, which were up to 1989.

7. Certain aspects expected to be found in this study will not be dealt with. For example on Public Bus Transport mainly, the public opinion will be taken into account following the information gathered with the questionnaire. Thus information on Organisation and functioning of the traffic, management and engineering departments will not be discussed since this requires a special study of its own under the same span of time as for this study. However, the existing situation of the Public Bus Transport (UBA) in terms of the number of buses, the route system and frequency of buses will be discussed.

8. The Central Business District though important for planning for various modes of travel is characterised by narrow roads and permanently built up areas which render difficulty in planning for the travelmodes. Thus readers should not expect much from this.

9. Though bicycle and pedestrian planning is very important for the third world it is not always possible to have say cycle and pedestrian tracks on every road because of the already existing urban form.

CHAPTER II

BACKGROUND ANALYSIS

2.1 Physical Characteristics

Dar-es-Salaam, "the Heaven of Peace" has been a capital of Tanzania since 1891 up to 1973 when the Government decided to transfer the capital to Dodoma within a period of 10 years.

Located on the shores of the Indian Ocean on the East African Coast is, and expected to remain, the chief industrial, commercial and tourist centre of the republic.

The administration of the city was under the Mayor of "The Dar-es-Salaam City Council" until the Government abolished City Councils in 1972. Under this step the city was made a region under the Regional Commissioner with three Area Commissioners heading the three districts of Temeke, Ilala and Kinondoni. (See Map No. 18).

The city is a part of the Coastal area behind which rises a great plateau up to over 1,200 metres above sea level. The Coastal area is a plain varying from 16 to 64 kilometres and there are steep eroded escarpments where the plateau and the plain meet.

The area on which the city is built is a relatively flat area at about 15 metres above sea level. This flatness is

interrupted by the four main creeks of Kurasini, Msinga, Kiminga and Msimbazi. Other small channels occur in the region and pick up water in the higher ground. The beds of the streams in the creeks are characterised by low flat flood plains with extremely steep banks which fall over 60 metres in some places. The Msimbazi creek has a wide flood plain but lower and less steep banks. Because of its closeness to the city core, Msimbazi creek has caused some development problems. The two (Morogoro and Bagamoyo roads) of the three major roads which cross it are part of the bottle necks during peak periods inspite of the expensive bridges which already exist there.

The city core is more oriented to the harbour area which extends from the main quay to the dockyards in Kurasini Creek. The harbour is the natural asset of the area and is the main reason for the present location of Dar-es-Salaam city.

The channel of water on which the harbour is located separates Dar-es-Salaam into two areas of which communication between them is only possible by a ferry. One part is the south-eastern area of Kigamboni. Development in this area has been very minimal. It is a flat area and a very low in some parts, coupled with swamps. The second part is in the North, West and South. Here is where most of the activities are concentrated. The ferry transport is another bottle neck at peak periods.

Further to the West and South-West, there are various rivers and undulating hills. These extend up to Kisarawe District at an elevation of from 34 metres to 300 metres. Kisarawe district however is not within Dar-es-Salaam region.

Climatically the area is hot and humid. The mean daily temperature is about 26°C (79°F). The mean seasonal range is 4°C (7°F) and the mean daily range is about 8°C (14°F). The relative humidity reaches almost 100% every night of the year and rarely drops below 35% during the day. This type of temperature and humidity makes the inhabitants suffer some discomfort during the period of November to April. Usage of non-motorised modes of travel (walking and cycling) is very uncomdusive since when they are used to travel to work there is considerable sweating and exhaustion which amount to poor efficiency of the workers.

Seasons of this climate are primarily controlled by the northward and southward yearly movement of the overhead sun. The sun is approximately overhead in Dar-es-Salaam at the end of March and again at the end of September when it is southerly from October to February.
The city is affected by two major wind movements namely the south East Trade Winds from the Indian Ocean occuring from April to September and the North-Easterly winds from an area usually closest the deserts of Arabia in the months of January to March.

There are two major rainy seasons and two dry seasons in Dar-es-Salaam. Of the rainy seasons that from March to May is by far the wettest. The October to December wet season is much more variable producing in some years very low totals and other years very high totals up to four times the average. The maximum rate recorded in 24 hours is 215 m.m. (8.5 in) at Msimbazi mission. On 6th April, 1976 a one-hour total of 107 mm. (4.2in.) was recorded at the Airport.

During the wet season rain is most common in the morning and early afternoons. This being the case workers are very much disturbed when going to their places of work during the rainy seasons. This again makesusage of non-motorised and uncovered modes of travelimpractical. People them, are forced to use public bus transport even at short distances to places of work. This results into the Public Bus Transport operating very inefficiently in the rainy seasons.

The predominant soil types in the city are red-soil, murram soil, grey soil and non-calcarious soil which has minimum fertility because of the salinity from the ocean water. The most prominent types of vegetation are palm trees, cashew nuts trees, and coarse grasses.

DAR ES SALAAM.
Topography.

SCALE
4 8 Km

LEGEND.

0 - 15 m.
15-46 m.
46-90 m.
90- Over.

A R Omari;
DEP OF URBAN & REG PLANNING;
UNIVERSITY OF NAIROBI 1975/76.

3.

2.2 Historical Development

Dar-es-Salaam was started as an Arab settlement by Sultan Majid of Zanzibar during the middle of 18th Century. The name Dar-es-Salaam (The Heaven of Peace) was given to the city by Majid. The place never acquired significant growth during Majid's reign because of the Port of Bagamoyo which is only 50 kilometres from Dar-es-Salaam and where slave trade with Zanzibar was very successful. Majid died in 1870 leaving Dar-es-Salaam without any significant development.

When the Germans came, in the late 19th Century to colonise Tanzania, they realised the importance of the site as a sheltered harbour. Some development therefore had to emerge and by 1888 the population was about 5,000. The Germans transferred their administrative functions from Bagamoyo in 1891 and by 1903 many buildings had sprung up. Among the structures were; hospitals, a number of government offices, a post office and meterological station. Also a number of private dwellings were built during these early years along the present Independence Avenue.

The Germans gave Dar-es-Salaam the structural character and urban form which it exhibits today. The streets converge at various angles upon a number of traffic circles resulting into a number of plots being triangular. Streets are generally narrow city blocks are irregular in size and shape and congestion

inspite of a moderate number of motor vehicles is very considerable. In short Dar-es-Salaam inspite of the Ocean exhibits characteristics of a radial pattern of an urban structure. The spokes are Morogoro Road, Pugu Road, Bagamoyo Road and Kilwa Road. The circumferential links are Libya Street - Jamhuri Street; Umoja wa Wanawake Street - Ohio Street; Msimbazi Street - Swahili Street - United Nations Road; Morocco Road - to be extended to Kigogo road through Magomeni, and lastly is the port access road.

Since the intention of the Germans was to colonise Tanzania, they had to extend their supremacy to the mainland. So between 1907 to 1914 a railway line was constructed from Dar-es-Salaam to Kigoma. This is the time when the railway station of Dar-es-Salaam was constructed. The railway station plus railway godowns and the railway engineering workshops form a substantial percentage of the land use of Dar-es-Salaam today.

After the World War in 1919 the British replaced the Germans in Tanzania. Because of the 1920 slump and the 1929 depression no significant development took effect until after the second world War in 1945, when the First Colonial Development and Welfare Act was passed and in 1947 a ten-year master plan for Tanzania took effect. This is the time when Dar-es-Salaam

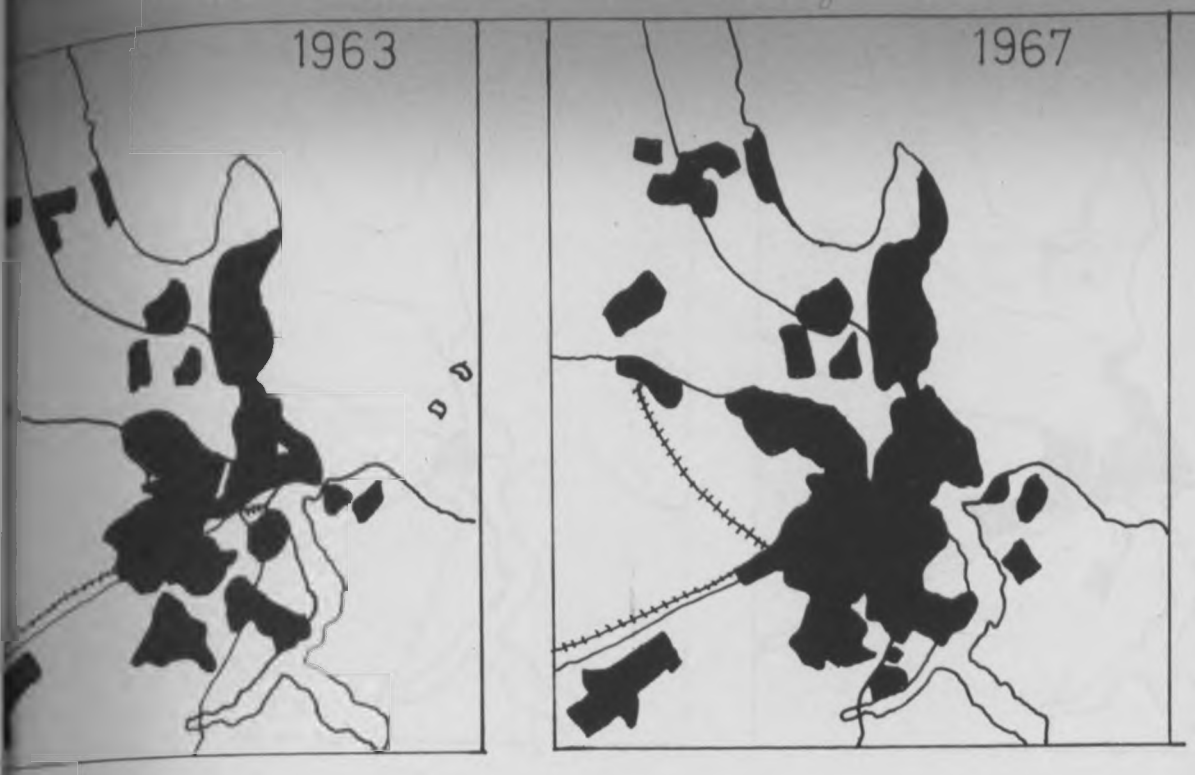
experienced a building boom under a special Dar-es-Salaam Master Plan of 1948 which was prepared by Alexander Gibbs and Partners. One of the major recommendations in this plan was to introduce a Public Bus Transportation system.

The harbour of Dar-es-Salaam remained virtually under-developed during the German period because there was no immediate need[11]. However the British tried to do some development on the harbour and in 1921 Belgium and Britain came to an agreement that Dar-es-Salaam should handle a few of Belgium Congo's goods through Kigoma. By 1950 construction of modern facilities on the port were started and completed in 1956.

The busiest times of the port started in 1966 when it started handling Zambian goods through the determination of Presidents Nyerere and Kaunda not to let Zambia depend on the racist government in the south. From that time congestion at the port has been very considerable inspite of the huge investments put to increase the number of berths. The Port area itself forms one of the major employment areas of the city, employing about 7,000 employees (See Map No. 11)

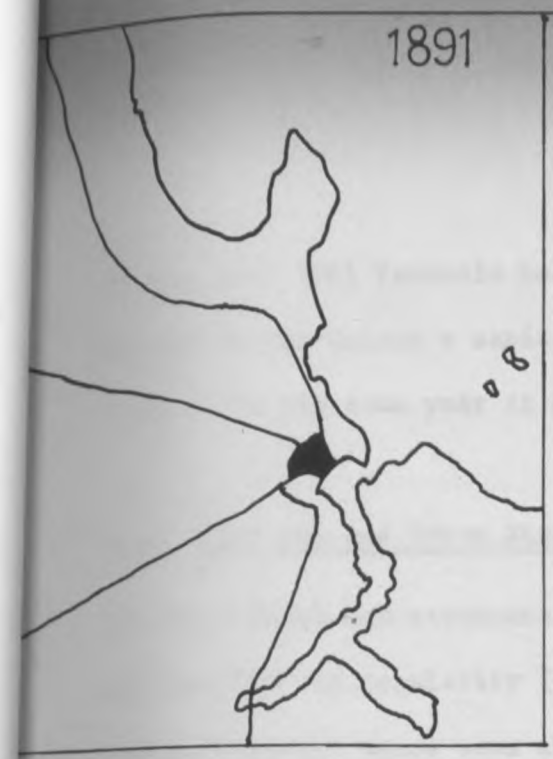
---

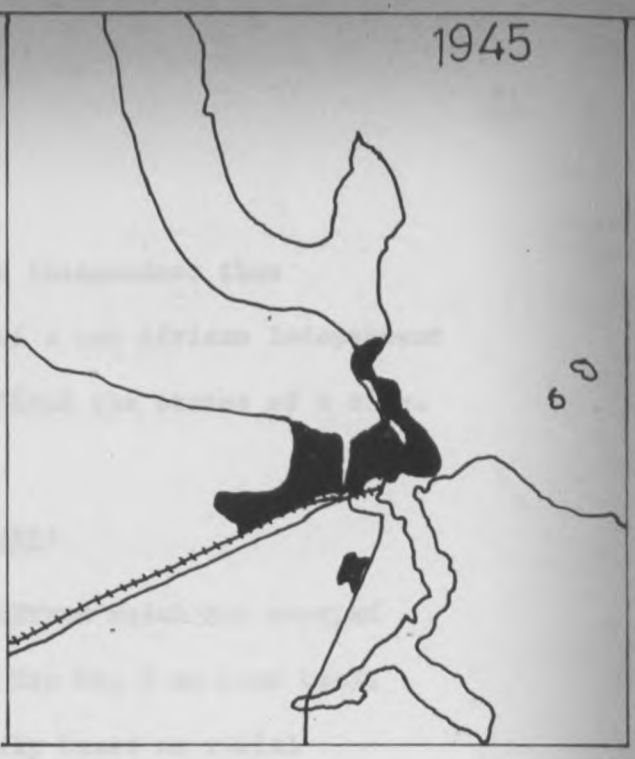
11. Dar -es-Salaam by De Blij - 1963
North Western University Press - Page 18.

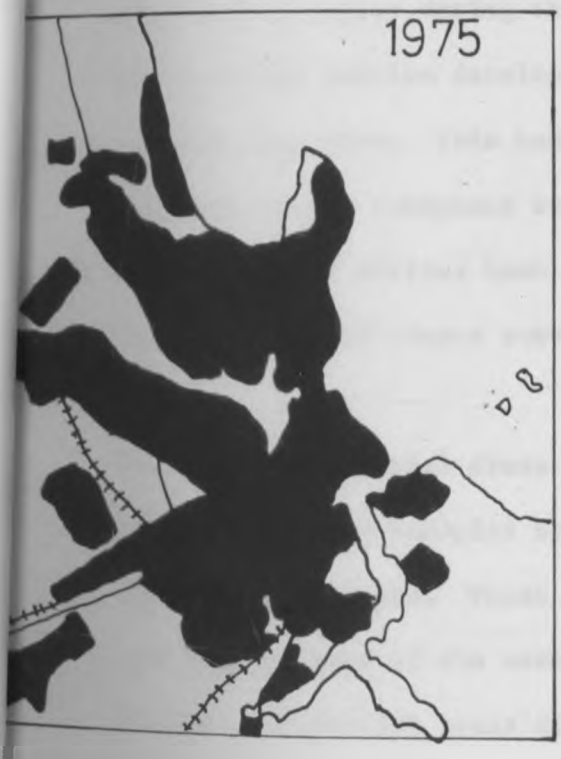


SOURCE: Dar Es Salaam Master Plan.

A R 'Omari
DEPT OF URBAN & REG PLANNING
UNIVERSITY OF NAIROBI 1975/76







DAR ES SALAAM.
Urban Growth.

In the year 1961 Tanzania became independent thus making Dar-es-Salaam a capital of a new African Independent State. In the same year it acquired the status of a city.

2.3. Land Use and Urban Structure:

The functional and structural pattern which had emerged do not show any regularity (See Map No. 5 on Land Use). The residential areas were chiefly based on racial segregation policy during the early years of development. The European section developed immediately east of the present city core. This has been the most favoured area in many respects. Europeans built trees/or shade and almost all Government offices have been situated here, though some residential houses survive even today.

The Asian residential areas developed to the west and north west of the area occupied by the white government officials and other residents. These are mainly areas of Upanga, and a large part of the core. Beyond these residential areas African residential areas of Kariakoo, Magomeni, Ilala and Temeke emerged. These were areas of object poverty, where streets were not improved, sewerage systems poor and facilities scarce. An empty stretch of Maazi Mmoja separated the African residential area of Kariakoo from the European and Asian residential areas.

Later residential suburbs did not follow a pattern of segregation particularly after the formation of the National Housing Corporation in 1962, which was and is still the main body providing residential houses to the majority of the city residents. It is followed by the newly formed Registrar of Buildings though later residential areas were not characterised by racial segregation they were however developed on the basis of income groups. In the north developed the high income residential areas of Oyster Bay, Msasani, Ada Estate and Regent Estate. Here residential density is very low and most residents own cars. Car ownership here was about one passenger car per five residents in 1967[12]. This helps to explain the prevailing traffic congestion at peak periods on Selander bridge where the road leading to these areas from the city centre pass. In the western parts of the city beyond the low income residential area of Magomeni developed the high density squaters of Manzese and in the west of Kariakoo beyond Ilala squarter areas of Buguruni and Kigogo sprawled. In the south-west, low and medium income residential areas of Temeke and Chang'ombe emerged. In the south the high income residential area of Kurasini developed after which low income residential area of Mbagala and Mtoni can be found. (Map No. 7 shows residential areas and the income distribution).

The Central Commercial and administrative area which form part of the CBD is located around the arc of the beautiful bay in the protected harbour and has been and is still the major

employment centre, with about 30,000 workers. Other employment centres are mainly industrial areas. The first industrial area to be established was around Pugu Road and Chang'ombe area. This explains why it is surrounded by low income but high density residential areas;(see Map No. 7). This main industrial area caters for about 23,000 workers. Further expansion on this area is very limited because of the limited available space. Another industrial area was established in 1966 at Ubungo. It now caters for about 10,000 employees. It has a bright future for expansion because it is a little further in the periphery where there is a lot of vacant land. Kurasini and Mgulani form another employment centre with some minor industries and various public institutions.

According to the Dar-es-Salaam Master Plan of 1968, Kigamboni area which has been for long, with minimal development is earmarked for Heavy Industrial development. So this will be a potential employment centre in future.

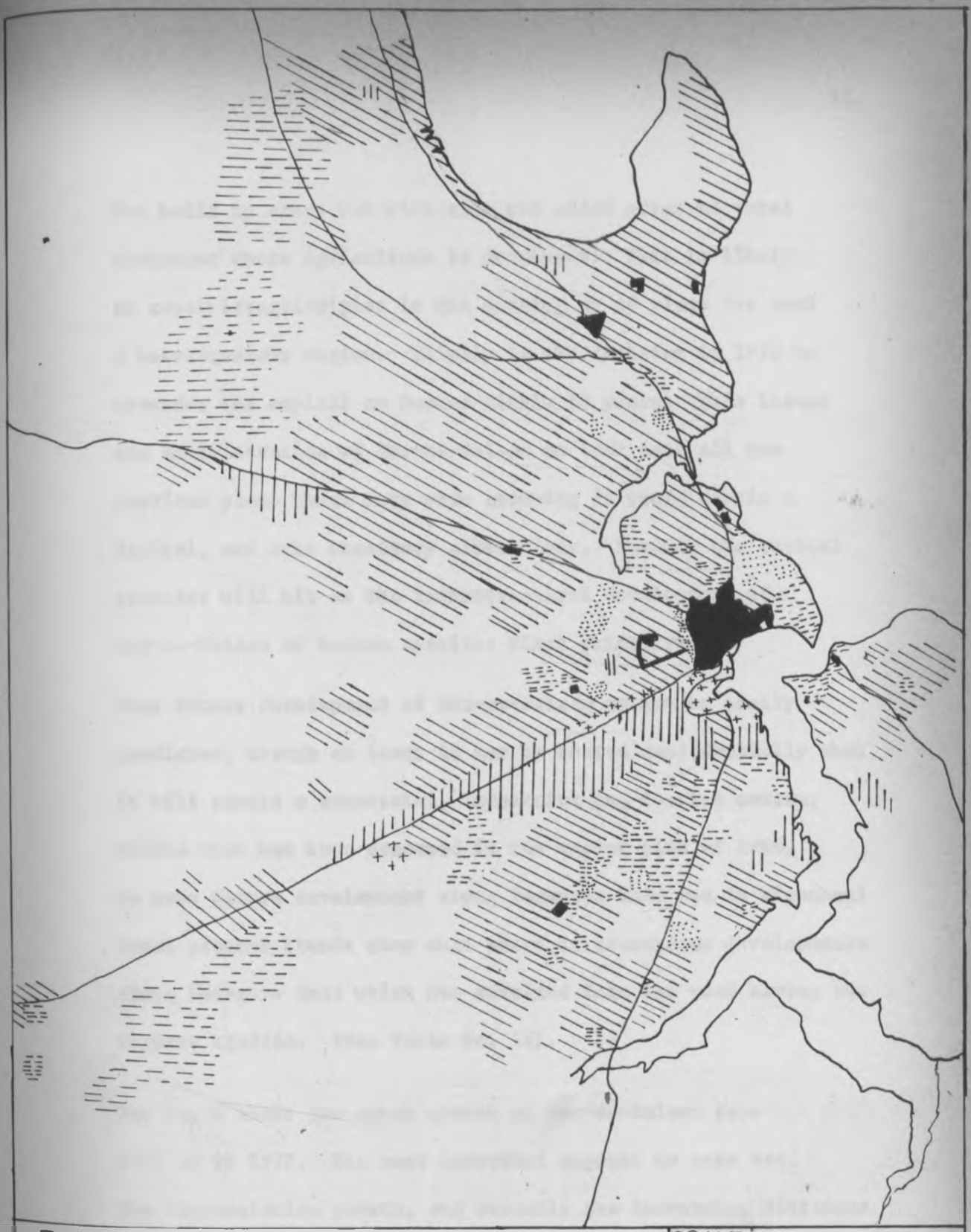
All secondary schools, decent primary schools and big Hospitals were placedclose to the central area but on the side of the Europeans' and Asians' residential areas. There has been no any noticable change on this pattern in recent years since any development on them involved more of their modification rather than construction of new ones. However many primary schools are within appropriate neighbourhoods in various residential areas.

Parks and sports grounds except in very few cases were concentrated on the side of Asian and European residential areas.

Agriculture dominates the areas presently incorporated in the city area.

One conspicuous feature of Dar-es-Salaam urban pattern is its fragmentation. Fragmentation means breaking up into small sections. This is caused by the seasonal rivers and tidal swamps cutting the site. Some of these features are the creeks of Msimbasi, Mzinga, Kurasini and Kizinga, and rivers of Luhanga, Mzinga, Ubungo, and Mwananyamala. The fragmentation has resulted into a number of individual towns and villages around a common core but each with their own nucleus and surrounding functional zones. Examples of these are Magomeni, Manzese, Ilala, Kinondoni, and Temeke.

Dar-es-Salaam development has been affected by three recent decisions from the Tanzanian Government. First is the abolition of city councils. This has minimised money making institutions which has affected implementation of projects. Secondly is the decentralisation measure of 1974 to make Coast Region into two regions (Dar-es-Salaam and Coast). The Dar-es-Salaam Region is headed by the Regional Commissioner and three Area Commissioners of the three districts of Ilala, Temeke, and Kinondoni. With this measure the administration of the city does not only deal with



DAR ES SALAAM.
Land Use (Existing)

SCALE: 0 1 2 3 4Km

SOURCE: Town Planning Office DSM.

LEGEND

- Industrial
- Railway & Port Areas.
- Open Space.
- Public Institutions & Gov't Offices.
- Residential.
- Commcial–Resdial.
- Vacant & Agr'ture.

A R Omari;
DEPT OF URBAN & REG-PLANNING
UNIVERSITY OF NAIROBI. 1975/76.

5.

the built up areas but with also the added areas of rural character where Agriculture is dorminant. This is likely to create irregularities in the setting up of plans for such a heterogenious region. Thirdly is the decision in 1973 to transfer the capital to Dodoma within 10 years. This leaves the administration of Dar-es-Salaam to look into all the previous plans which were made assuming it would remain a Capital, and make necessary alterations. Further the capital transfer will hit on the infrastructural development of Dar-es-Salaam as Dodoma receives first priority.

Thus future development of Dar-es-Salaam cannot be easily predicted, though at least it can be stated confidentially that it will remain a commercial, industrial and tourist centre. Unlike what has been proposed in the master plan of 1968, to have future development along Bagamoyo Road and in Kigamboni Area; present trends show that there is tremendous developments along Morogoro Road which has resulted into the road having the highest traffic. (See Table No. 12).

Map No. 4 shows the urban growth of Dar-es-Salaam from 1891 up to 1975. The most important aspects to note are, one fragmentation growth, and secondly the increasing distances from the core.

2.4. Population Characteristics, Trends and Projections

Like many cities in developing countries Dar-es-Salaam has been experiencing high population growth rate. Table No. 2 shows how the increase in population has been taking place since 1894 up to 1975.

TABLE NO. 2 POPULATION TRENDS

Year	Africans	Asians	Europeans	Others	Total
1894	9,000	620	400	--	10,000
1900	18,000	1,480	360	--	20,000
1913	19,000	2,500	1,000	--	22,500
1921	20,000	4,000	600	--	24,600
1931	24,000	9,000	1,330	--	34,300
1943	33,000	11,000	1,100	--	45,100
1948	50,765	16,000	1,726	466	69,277
1952	77,330	22,547	3,603	660	99,140
1957	93,363	29,986	4,479	914	128,742
1965	183,000	32,000	4,900	3,500	223,000
1967	--	--	--	--	300,000
1973	--	--	--	--	500,000
1975	--	--	--	--	600,000

Source: Gillman C. Clement "Dar-es-Salaam 1860-1940" in Tanganyika Notes and Records Vol. 20 1945 P.22

N.B. Figures from 1967 up to 1975 are a little more than what has been projected in the Master Plan of 1967. This might be due to the fact that there has been a continuous expansion of city boundaries since that time.

There has been some variation on the growth rate. For example the growth rate between 1948 to 1957 was 10% while from 1967 to 1973 it was 8%. The government has however anticipated to reduce the growth rate to 6% by 1975. Present figures reveals a growth rate of 7.5% The reason for this is the fact that though the natural growth rate might have been reduced, the boundaries of the city have continuously been revised to include an even large area. This means there is an extra population increase from the included area, in addition to natural growth trends.

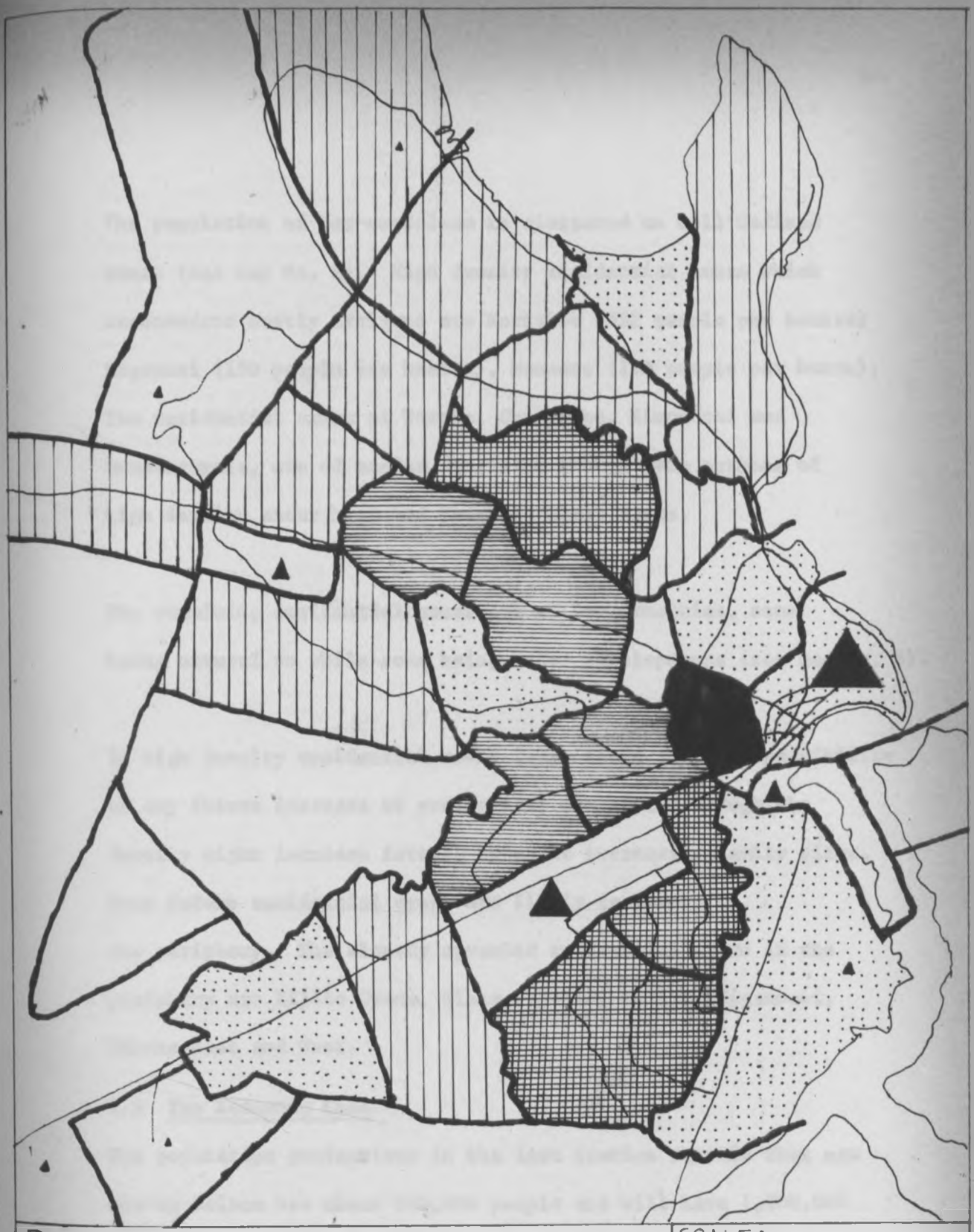
Assuming a growth rate of 7.5% up to 1980 and 6% onwards the projected population for the future would be as shown on table No. 3.

TABLE NO. 3 - POPULATION PROJECTION

Population	Year
600,000	1975
800,000	1980
967,000	1985
1,300,000	1990

Source: Author's projections based on 6% and 7.5% growth rates.

The population composition has been and is still dominated by Africans. Table 2 reveals that the number of Asians and Europeans has always been few though the Asians seem to have increased in number in later years.



DAR ES SALAAM.
Population Density.

SCALE: 0 1 2 3 4 Km

LEGEND.

- Non-residential Areas.
- 0-25 Persons / Hectre.
- 26-50 Persons / Hectre.
- 51-100 Persons / Hectre.
- 101-200 P'ons/Hectre.
- Over 200 P'ns/H'ctre.
- Employment Areas.
- Zone Boundary.

A R Omari,
DEP. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76.

6.

The population of Dar-es-Salaam is clustered on well defined zones (see map No. 6). High density residential areas which accommodate mostly Africans are Kariakoo (452 people per hectre) Magomeni (150 people per hectre), Manzere (190 people per hecre). The residential areas of Temebe, Chengombe, Kinondoni and Mwanayamala, are of medium densities though some patches of high density occur here and there in these areas.

The remaining residential areas are of low densities, some being natural so while some being under developments (see map No. 6).

In high density residential areas there seems to be no possibility of any future increase of residential structures though the density might increase further owing to increasing family sizes. Thus future residential areas are likely to sprawl in the periphery. The already sprawled residential areas in the periphery are Kijito Nyama, Sinza, Ubungo, Kimora, Kigamboni, Tabaka East and West.

2.5 The Economic Case

The population projections in the last section reveals that now Dar-es-Salaam has about 600,000 people and will have 1,300,000 people by 1990. All these people require to earn a living and raise their standards of living. This calls for future job opportunities to increase at least on the same pace with population growth and if possible exceed it.

By the time this study was being carried out the National Statistical Bureau had no employment figures for 1975. Even figures for 1972 to 1974 were still provisional. Table No.4 show the number of people employed from 1961 to 1974. It is clearly seen from this table that there has been a general reduced growth rate of employment. For example the increase in labour force for the last few years has been:

1969/70	-	10%
1970/71	-	5%
1971/72	-	5%
1972/73	-	40%[13]
1973/74	-	30%

From the above growth rate of the labour force it is reasonable to assume a future growth rate of labour force of 6%.[14]

Taking into account of the labour force to be transferred to Dodoma in the years to come (See Table No. 12) it is possible to project the future labour force. Table No. 5 shows employment from 1975 to 1990. The fact that 20% of the workers in Governmental ministries has been expelled in February 1976, was not taken into

---

13. This exceptional increase was a result of TAZARA workers who by now have already left the place.

14. This figure agrees with the figure from Ministry of Finance and Planning.

account because when the Ministry of Manpower Planning and Development was approached by the author it was said that the expelled workers could be employed anywhere else in parastatal organisations. The accuracy to include the 20% in projecting the labour force has been found to be rather unrealistic.

TABLE NO. 4 - EMPLOYMENT FIGURES -1961-1974-DSM

Year	Number of People Employed
1961	37,107
1962	42,194
1963	43,497
1964	45,802
1965	54,802
1966	59,124
1967	65,246
1968	70,655
1969	71,788
1970	79,416
1971	83,271 (Provisional)
1972	87,365
1973	127,417
1974	96,053

Source: Statistical Bureau - Dar-es-Salaam - 1974

TABLE NO. 5 PROJECTED EMPLOYMENT FIGURES FOR DAR-ES-SALAAM - 1975-1990

Year	Number of People Employed
1975	101,816
1976	101,395
1980	122,290
1985	150,380
1990	190,584

Source: Author's projections.

The significant opportunities for employment in Dar-es-Salaam are in the areas of manufacturing commercial public service (Government) transportation and construction (See Table No. 6) These functions constitute the cities economic base.

The income distribution for Dar-es-Salaam ranges from 380/- (minimum pay) per month to about 5,000/- per month. Of course there are people who earn more than 5,000/- per month depending on what type of jobs they do. So the income categories are classified as:-

(i) Low income group - below 750/- per month

(ii) Medium income group - between 751/- to 1,500/- per month

(iii) High income group - above 1,500/-

The above categorisation is in accordance with the house rent structure where low income earners pay 7½% of their monthly income while the medium income group pays 10% and the high income ones pay 12½%.

The income distribution of the people interviewed is shown on Table No. 7. From the table it is clear that the majority of the people are within the low income bracket and as such most of the problems identified affect the low income group.

TABLE NO. 6 - EMPLOYMENT IN DAR-ES-SALAAM BY INDUSTRIAL MAJOR DIVISION

Division	Year							
	1967*	1969	1970	1971	1972	1973	1974*	1980*
Agriculture	500	372	546	981	1,178	--	800	1,900
Mining & Quarrying	400	85	93	81	62	--	650	1,500
Manufacturing	12,000	16,292	17,656	23,411	22,518	--	21,800	45,000
Public Utilities	700	1,446	1,949	1,372	1,683	--	1,050	2,500
Construction	12,000	12,260	14,323	10,651	6,387	--	19,600	46,100
Commerce	17,000	7,978	9,157	9,999	10,175	--	26,800	54,700
Transport & Communication	6,000	15,593	16,026	17,744	16,379	--	8,950	21,000
Finance	?	2,709	3,249	3,778	4,517	--	?	?
Services	25,800	15,053	16,417	15,254	16,972	--	42,000	99,000
Total	74,400	71,788	79,416	83,271	80,071	127,417	121,050	271,700

Source: Survey of Employment and Earnings - Tanzania 1972

* Figures from Master Plan projections - 1968

? These figures are included with figures for Commerce.

TABLE NO. 7 - INCOME DISTRIBUTION

INCOME (Rs/Month)	NUMBER OF PEOPLE	PERCENTAGE
0 - 380	572	23.8%
381 - 750	1440	60.0%
751 - 1500	295	12.3%
1501 - 2500	76	3.2%
2500+	16	0.7%

Source: Sample Survey

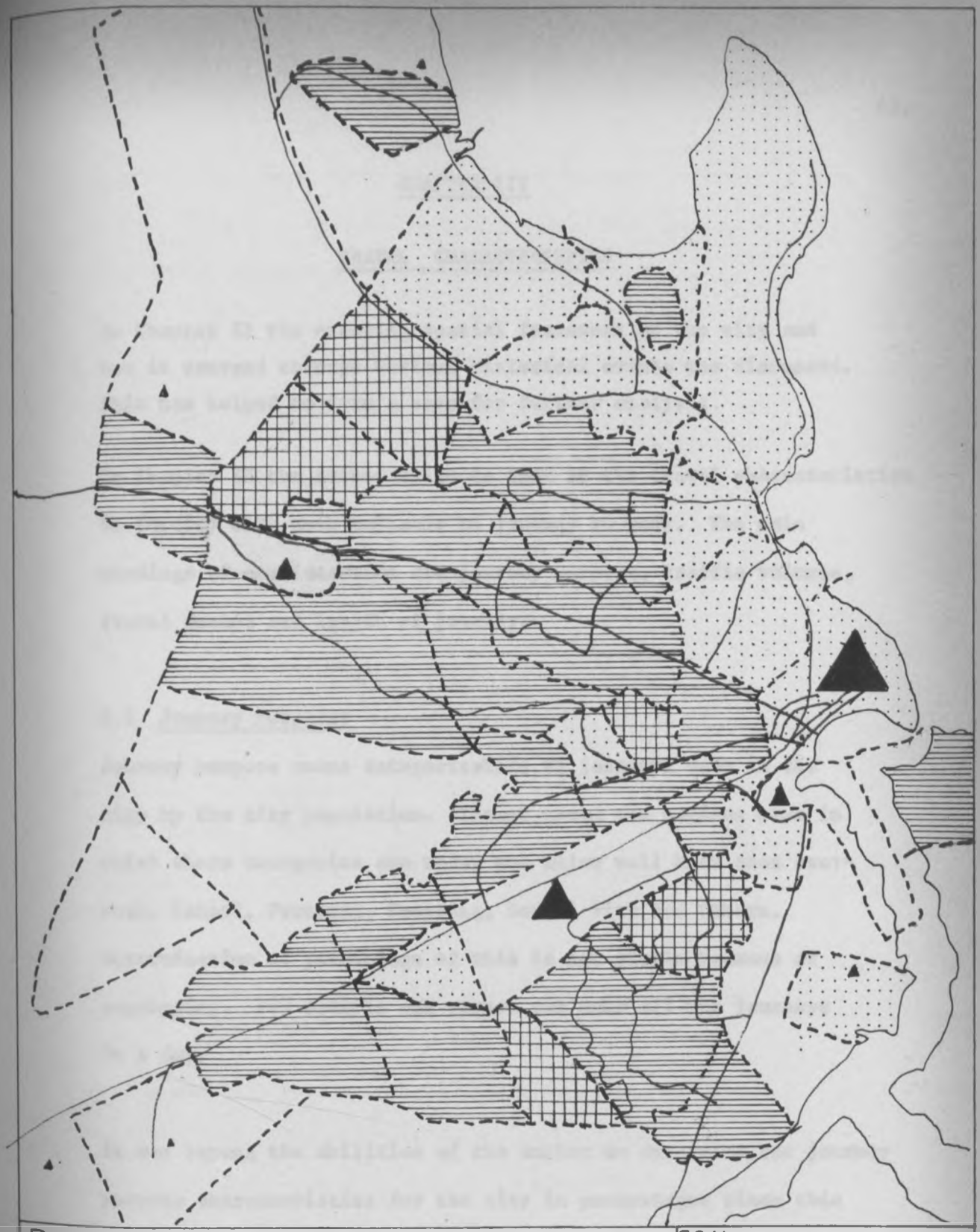
The employment zones are clearly defined though in few cases overlapping with residential areas occurs. There has been minimum decentralisation of employment centres.

It was not possible to determine the employment capacities and capabilities of different industries and institutions in location, but number of employees in every employment zone has been stated (See Map 11). The number of people employed in every zone coupled with residential densities reveal possible tidal flows of workers every morning (see Map No. 9 on desire lines for work trips). The Map No. 7 which show the spatial income distribution help to identify which areas require planning for which modes of travel to work. Thus a critical observation of the income distribution, residential density, distances of residential areas from various employment centres and the various roads connecting various employment centres and residential areas help to determine which are major roads or areas which require special attention in terms of traffic segregation.

TABLE NO. 8 - RESIDENTIAL AREAS IN THEIR INCOME CATEGORIES

Residential Area	Income Category
Oyster Bay	High
Msasani	High and low
Regent Estate	High
Upanga	High
City Centre	High
Kurasini	High
Upanga	High
Kinondoni East	High
Kinindoni West	Low
Mwanayamala	Medium and low
Magomeni	High, medium and low
Manzese	Low
Ubungo	Medium and low
Kigogo	Low
Mburahali	Low
Mabibo	Low
Buguruni	Low
Ilala	High, medium and low
Kariakoo	Low
Temeke	Medium and low
Tandika	Medium and low
Mlemi	Low
Mbagala	Low
Kipawa	Low
Kigamboni	Low

N.B. According to the government policy of Tanzania new residential areas are likely to be of mixed income groups.



DAR ES SALAAM.
Income Distribution.

SCALE: Km
0 1 2 3 4

LEGEND.

- Low Income Group.
- Medium Income Group.
- High Income Group.
- Employment Centre

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76.

7.

CHAPTER III

TRAVEL CHARACTERISTICS

In Chapter II the existing spatial framework of the city and how it emerged through various historical events was discussed. This has helped to form a base for further analysis.

In Chapter III the author tries to look at the travel characteristics in the city with much emphasis on journey to work. The main headings of consideration are journey purpose, traffic volumes, travel demand and length of journey.

3.1 Journey Purpose:

Journey purpose means categorisation of journeys made in the city by the city population. Though there are various ways in which these categories are made, the major well know ones are:- Work, School, Personal, Shopping, Social Firm and Others. Determination of percentage of this is not simple because of overlapping. For example one person can make all the journeys in a day.

It was beyond the abilities of the author to determine the journey purpose characteristics for the city in percentages since this could require a house to house survey which the author could not afford to do because of time and personnel. Even previous studies have not been able to determine the journey purpose characteristics for Dar-es-Salaam.

Thus without loss of generality it has been assumed that the work journeys in Dar-es-Salaam constitute about 40% of all journeys made in that city per day. Further it is assumed that the school

journeys constitute about 10.0% of all journeys made in a day. Table No. 9 shows journey purposes for Nairobi in order to support the above assumptions:

TABLE NO. 9 : %JOURNEY PURPOSE

Nairobi-1970[1]

Work	38.0%
School	27.0%
Personal	18.0%
Social	8.0%
Shopping	7.0%
Firm's Business	3.0%
Others	2.0%

Source: 1. Nairobi Urban Study Group - 1970

In this study work journey and school journeys have been combined since as stated in the introduction they take place at almost the same time during morning peak period in Dar-es-Salaam. Though other journeys take place in the morning peak period they cannot be easily predicted and are of insignificant percentages.

Therefore this study is dealing with peak period travelling which constitute about 30% of all journeys made per day in Dar-es-Salaam. Peak period travelling is significant because it involves travelling for a short period of time so that issues like delays, congestion

and accidents are likely to be common. It is therefore very significant to plan properly for peak hour travelling since it affects efficiency and productivity of workers and thus affecting National Development.

3.2. Peak Hour Traffic Volumes

The amount and types of traffic generated by a land-use can be measured in persons or vehicles per unit area distributed in time. Each land use whether it be a school, factory, house or park is a generator of traffic. The traffic may be pedestrian, cyclist or vehicular and depending on its relationship to other generating units, traffic flow in Dar-es-Salaam is developed locally and is distributed throughout the hours of the day and in varying proportions. The peak period traffic however is very specific with time and is the highest of the daily traffic, and with minimum variations.

Some traffic volume counts have been conducted in Dar-es-Salaam by the Project Planning Associates of Toronto in 1967 and the National Transport Corporation in 1974. The former is no longer up to date and the latter was not comprehensive. But since these are the only available studies in which traffic survey were done, the author has used these as basis for future traffic projections.

In the analysis of the traffic volume units on PASSENGER CAR units (P.C.U. or P.C.E.) have been adopted. These compare well with international standards. The following passenger car equivalent have been used:-

1 Car or van	1.00	Passenger Car Equivalent (units)
1 Medium or heavy truck	2.00	"
1 Bus	3.00	"
1 Motorcycle	0.75	"
1 Bicycle	0.33	"

Basing on the above standards the vehicular traffic volumes on major roads as given in the Dar-es-Salaam Master Plan - 1968 for 24 hours is given on Table No. 10.

TABLE NO. 10 - TRAFFIC VOLUME-1968

	Road	Traffic Volume
1.	Pugu Road between Chan'gombe Road and D.T. Dobie junction	27,140 P.C.E.
2.	Bagamoyo Road at Slender Bridge	17,628 "
3.	Morogoro Road between Magomeni and Kariakoo	16,515 "
4.	Uhuru Street between Lumumba Street and Jamuhuri Street	15,843 "
5.	Nkurumu Street	14,254 "
6.	Kilwa Road at Ceresani Street Roundabout	13,372 "
7.	United Nations Road at Morogoro Road intersection	13,304 "
8.	Upanga Road	12,316 "
9.	Maimbazi Street	12,210 "
10.	Independence Avenue between Morogoro Road and Azikiwe Street	11,927 "

TABLE No. 10 ....Cont....

Road	Traffic Volume
11. Jamburi Street	11,666 P.C.E.
12. Chang'ome Road	11,346 "
13. Azikiwe Street	10,994 "
14. City Drive between Morogoro Road and Azikiwe Street	10,965 "
15. Swahili Street	10,429 "

At about 3 kilometres radius from the city centre the traffic volumes were found to decrease drastically, being at about the 2000 p.c.e. level on the four radial arterials.

Table No. 10 revealed three major points of congestion in Dar-es-Salaam in 1968:- Pugu Road, east of Chang'ome Road; Bagamoyo Road at Slender Bridge; and at Morogoro Road between Magomeni and Kariakoo.

However presently there has been some major changes which have affected traffic volumes on some major roads.

(1) Ubungo area has developed not only into a major industrial area but also into a major residential area. This has increased traffic on Morogoro Road tremendously.

(2) Msimbazi Street in addition to having been a route for all buses since the beginning of construction

of Kariakoo market, it has also been one of the major links between the North and Western residential areas and the south east and south Industrial and residential areas. This has also increased traffic very much on this street.

(3) There has been a low growth rate of car ownership in Dar-es-Salaam (See Section 4.4). This has disrrupted the previous projections on the congestion rate at Slender Bridge, since through this brige passes Bagamoyo Road heading to the high income residential areas of Oyster Bay, Masasani and Regent Estate, where there is the highest level of car ownership.[15]

Therefore the above changes in addition to many others, the major points of congestion in order of priority starting with the point of the highest congestion are:- (See Map No. 10)

1. Morogoro Road between Ngarenaro and Kariakoo
2. Pugu Road east of Chang'ombe Road
3. Bagamoyo Road at Slender Bridge
4. Uhuru Street
5. Maimbani Street

The above hierarchical order is supported by a traffic survey conducted by the National Transport Corpotation in August, 1974, between 7.30 a.m. and 8.30 a.m. at the junctions of (a) Pugu Road,

---

15. Opcit - Dar-es-Salaam Master Plan - 1967

Bandarini Road, Msimbazi Street and Nkurumah Street (b) Morogoro Road and United Nations Road. The results were 2680 vehicles per hour for Morogoro Road and 1620 vehicles for Pugu Road. To convert the vehicular traffic into p.c.u. units, then 2.0 p.c.u has been assumed as an average, and the above figures will then be:-

Morogoro Road:-	5360 p.c.u. per hour
Pugu Road:-	3240 p.c.u. per hour

The traffic volumes on Table No. 12 can be changed into peak hour volume by using the Hourly Variation in Passenger Car Equivalents as given in the Master Plan for all major roads (754 - Transportation Studies Plates 9 - 12).

The projected traffic at peak period is shown on Table No. 12. The assumptions made are the existing conditions and transfer of Capital to Dodoma. The shift of capital to Dodoma will affect the future traffic volumes since it will involve a substantial number of workers in the formal sector to shift from Dar-es-Salaam to Dodoma. This will automatically affect the journey to work traffic volume growth.

According to the officials of the Capital Development Authority Dodoma, five ministries will have shifted by 1980. Table No. 11 shows numbers of employees to be transferred to Dodoma up to 1980 and subsequent projections up to 1990.

TABLE NO. 11 DODOMA TRANSFER PROGRAMME FOR GOVERNMENT BODIES

Year	1976	1977	1978	1980	1985	1990
No. of Employees	7,130	8,418	9,706	10,994	12,281	36,841

Source: 1976 - 1980 figures obtained from Capital Development Authority Headquarters - Dodoma. 1985 & 1990 figures have been projected.

The figures for employees to be shifted to Dodoma include only Government bodies and not other employment sectors which means that the figures for the employees is likely to be more than what is shown in table No. 11.

TABLE NO. 12 - PEAK PERIOD TRAFFIC VOLUME FOR MAJOR ROADS (1976) IN P.C.U.

Year	1968[I]	1975	1978	1980[IV]	1985[IV]	1990[IV]
Morogoro Road	1,500	5,360[II]	5,360	6,480	7,960	10,100
Pugu Road	2,600	3,240[II]	3,240	3,910	4,800	6,080
Bagamoyo Road	1,700	2,110[III]	2,110	2,550	3,140	3,990
Uhuru Street	1,550	1,930[III]	1,930	2,330	2,860	3,620
Nsimbasi Street	1,170	1,455[III]	1,455	1,751	2,150	2,730
Kilwa Road	1,150	1,430[III]	1,430	1,730	2,110	2,670

Sources: I Dar-es-Salaam Master Plan
II N.T.C. Traffic Survey
III Projections for Past Trends
IV Projections Assuming Labour Force

Looking at the design capacity of the main Roads in Dar-es-Salaam one can see why congestion is very high on these roads since the present traffic has already exceeded the design capacity of the roads (See Table No. 13)

TABLE NO. 13 - DESIGN CAPACITY OF THE ROADS

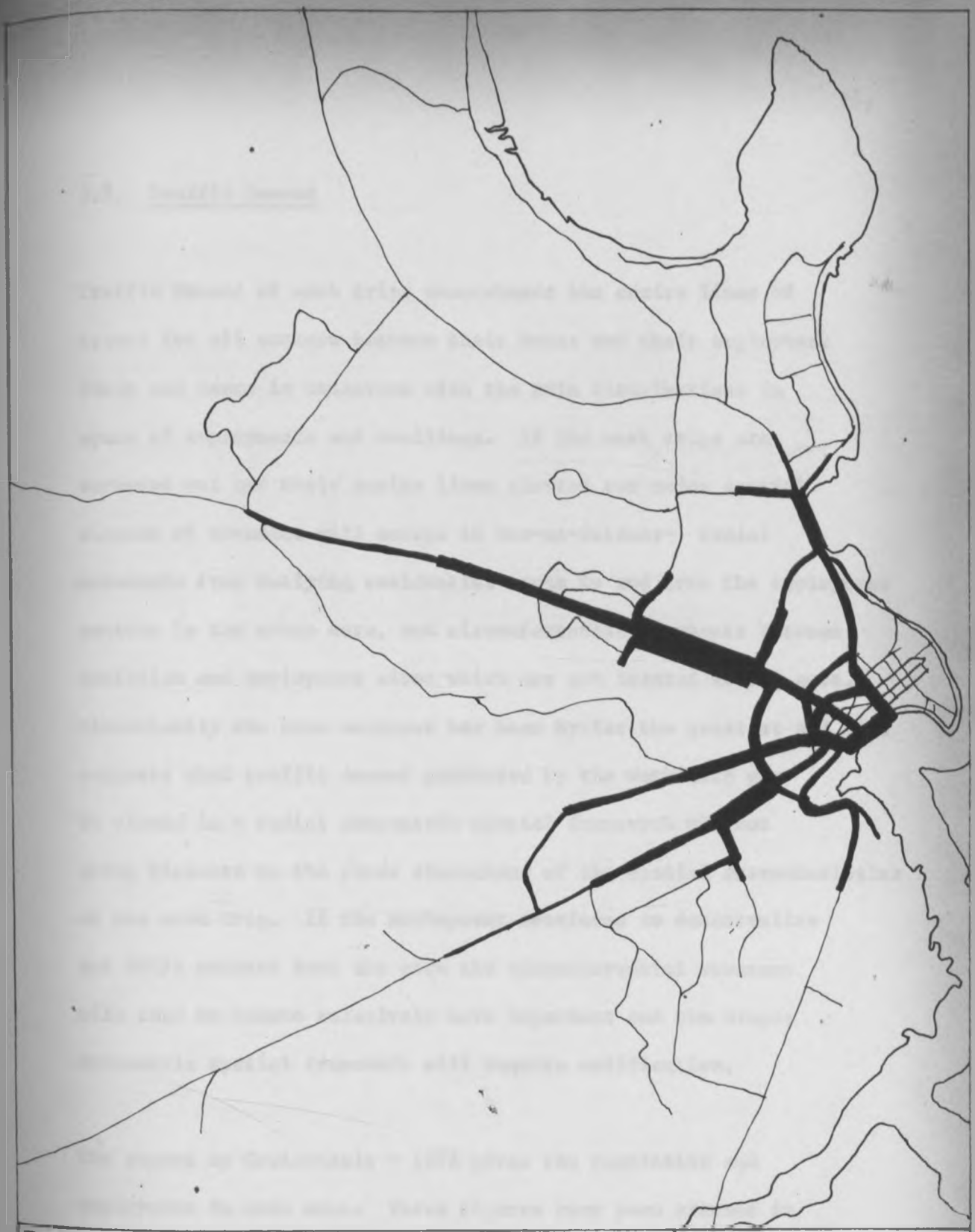
	Road	Traffic Volume I Design Capacity (P.C.E) Per Hour	Traffice Volume in 1976 (P.C.E.) Per Hour
1.	Morogoro Road	2,000	3,360
2.	Pugu Road	4,800	3,240
3.	Kaganeyo Road at Slender Bridge	1,500	2,110
4.	Uhuru Street	1,200	1,930
5.	Msimbazi Street	1,500	1,455
6.	Kilwa Road	1,500	1,430

Source: I. Roads in Urban Areas by Ministry of Transport..

Scotish Development Department
The Welsh Office - 1966 - Page 7

II. Projected figures from Table 12.

A closer look at table No. 12 and 13 will show that non of these roads will be able to handle the traffic by 1990. So there is a need to do road widening, divert some traffic from passing through these roads, and finally decentralise some employment centres to minimise traffic movement at peak hour on some of these roads.



DAR ES SALAAM.
Peak Period Traffic Volume.

SCALE:
0 1 2 3 4

SOURCE: Tabulated Data.

LEGEND.

6000 5000 4000 3000 2000 1000

Volume Scale in Passenger Car Equivalent.

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI. 1975/76.

8.

3.3. Traffic Demand

Traffic Demand of work trips comprehends the desire lines of travel for all workers between their homes and their employment sites and hence is concerned with the twin distributions in space of employments and dwellings. If the work trips are screened out and their desire lines plotted two major spatial classes of movement will emerge in Dar-es-Salaam:- radial movements from outlying residential areas to and from the employment centres in the urban core, and circumferential movements between domiciles and employment sites which are not located at the core. Historically the core movement has been by far the greatest and this suggests that traffic demand generated by the work trip can be viewed in a radial concentric spatial framework without doing violence to the gross dimensions of the spatial characteristics of the work trip. If the employment continues to decentralize and shift outward from the core the circumferential movement will tend to become relatively more important and the simple concentric spatial framework will require modification.

The report by Cowiconsult - 1973 gives the population and employment in each zone. These figures have been assumed in order to determine the desire line map (Map No. 9) for work trips.

Table No. 14 shows population and employment per zone. Zones with the largest population are major potential trip generators while zones with largest employment are the major potential trip attractors. Map No. 11 shows the zones mentioned.

The desire line map displays that there are far more radial movements than circumferential one, Further, some people staying near certain employment centres do not work there instead they go to work in employment centres which are far away from their domiciles. This is an indication of say lack of proper housing allocation policy. Furthermore, it indicates a need to decentralise employment wherever possible.

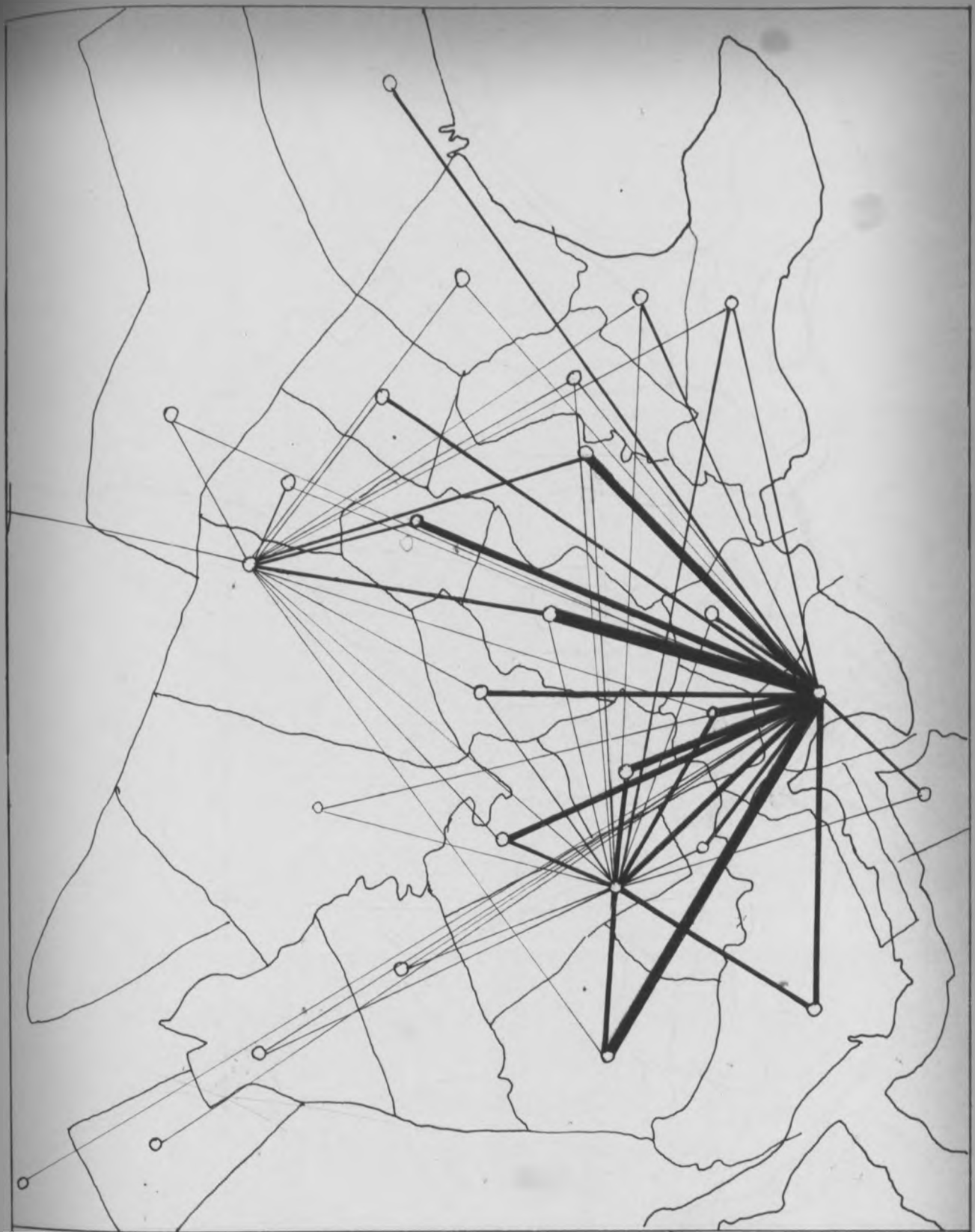
TABLE NO. 14 - POPULATION AND EMPLOYMENT PER ZONE - 1973

Zone	Population	Employment
1. Oyster Bay	8,000	4,000
2. Upanga	13,000	3,000
3. Centre	15,000	23,000
4. Kigamboni	6,000	1,000
5. Kurasini/Mtoni	39,000	2,000
6. Temeke	45,000	4,000
7. Chang'ombe	23,000	9,000
8.A Ilala	29,000	3,000
8.B Buguruni	46,000	1,000
9. Kariakoo	45,000	17,000
10. Magomeni	53,000	4,000
11. Kariakoo/ Mwanyamala	25,000	400
12. Regent Estate	3,000	100
13. Msasani	10,000	100
14. Mansese	53,000	400
15. Srinsa	1,000	300

Table No. 14 ....Cont....

	Zone	Population	Employment
16.	Kijito Nyama	3,000	200
17.	Mbezbeni	1,000	200
18.	Kigogo	15,000	—
19.	Tabata East	—	—
20.	Tabata West	—	—
21.	Kawe	10,000	2,000
22.	Fugu Road Industrial Area	5,000	14,000
23.	Port Area	—	7,000
24.	Vingunguti	10,000	1,500
25.	Airport	—	400
26.	Ubungo Industrial Area	9,000	6,000
27.	Ubungo University	5,000	3,000
28.	Kipawa	14,000	200
29.	Ubonga	12,000	1,000

Source: Cowiconsult report 1973.- Page 16



DAR ES SALAAM.
Peak Period Desire Lines

SCALE:
0 1 2 3 4
SOURCE: COWIconsult data - 1973.

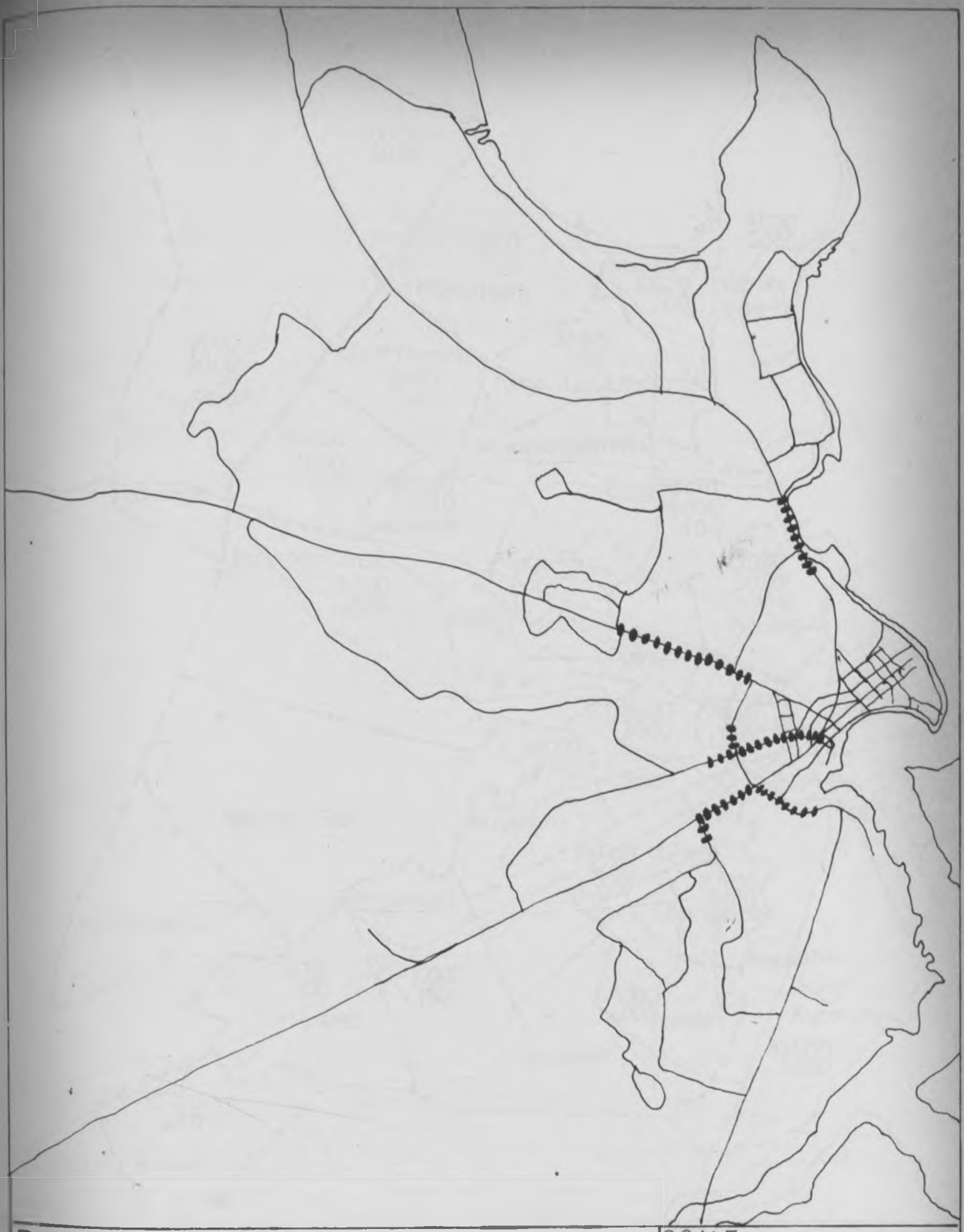
LEGEND

o Assumed Centre of gravity of zone.

Scale of lines:- 1mm represents 5% of workers.

AR Omari;
DEPT OF URBAN & REG PLANNING;
UNIVERSITY OF NAIROBI. 1975/76.

9.



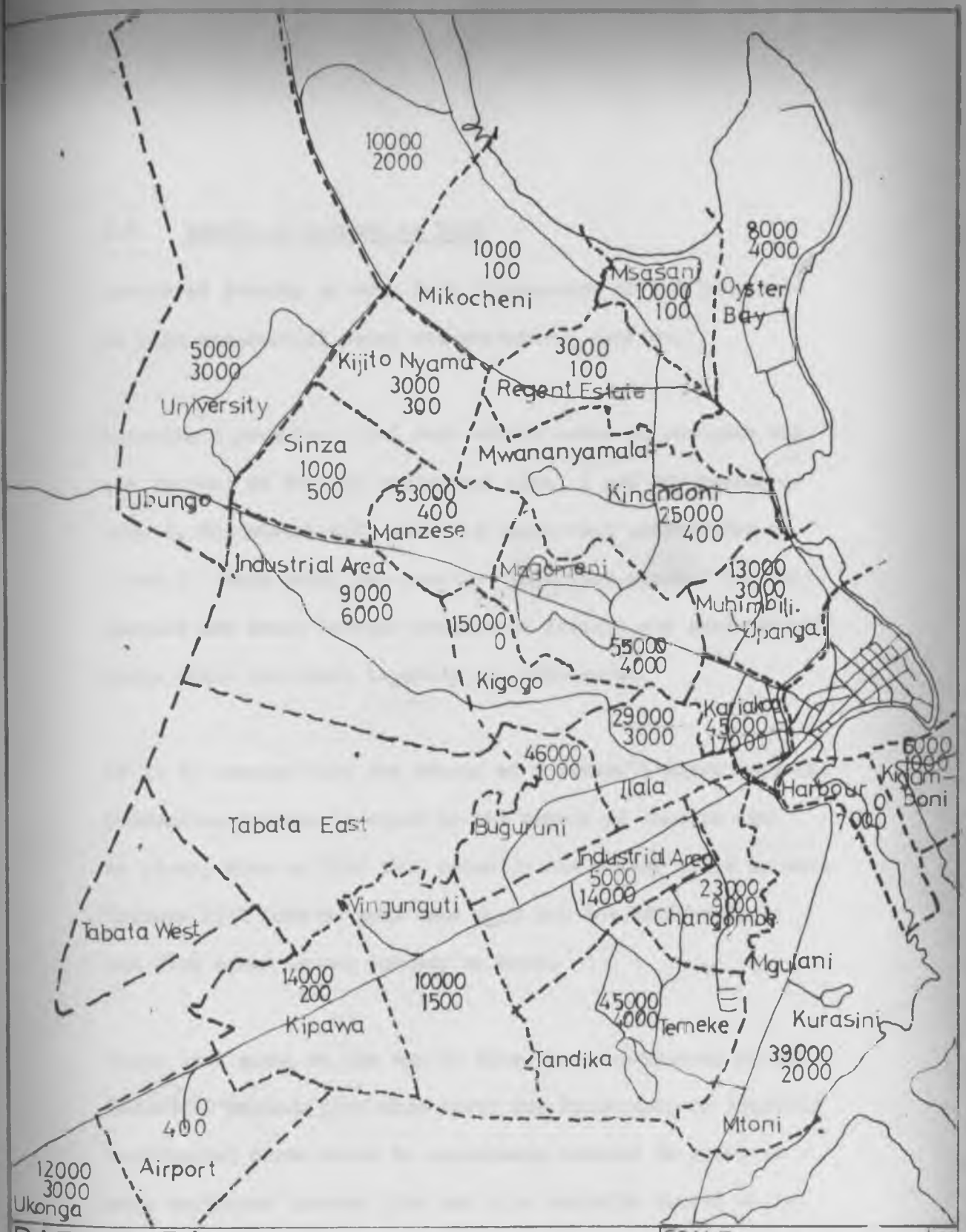
DAR ES SALAAM.
Areas of severe traffic problems.

SCALE:
0 1 2 3 4

LEGEND.

Traffic Congestion.

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76



DAR ES SALAAM

Analysis zones: Population and Employment

SCALE: 0 1 2 3 4 km

SOURCE: COWIconsult Report –1973.

LEGEND

--- Zone Boundary.

Above: The population in the zone.

Below: The employment in the zone.

A.R.Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI. 1975/76.

3.4. Length of Journey to Work

Length of journey to work is a consequence of the locations of both residential areas and employment centres.

Assuming a postulate that each worker seeks to maximise his net income; so for any employment site j and any residence site i, the worker will seek the least-cost combination of i and j. This being the case one finds that greater travel demands are found between employment centres and residential areas which are close together and vise veras.

If it is assumed that the amount of a worker's input into the production process is equal to the amount of leasure time he gives, then we find that actually the worker gives up more leisure time than he puts into work and the difference is the time spent in the journey to work.

Since time spent on the way is directly proportional to the length of journey then this shows the importance of locating residential areas close to employment centres in order to save employees leasure time and also minimise travel costs.

Appendix No. II A,B, and C shows calculated distances from major employment centres to major residential areas. Using this appendix the questionnaires were analysed and percentages were calculated of employees staying at various distances from major employment centres (Tables 15A to D shows these results).

The Table 16 shows similar results for pupils interviewed. Both results seem to follow the same pattern. The graphs of plate No. 1 show the behaviour of lengths of journey for both students and workers.

TABLE 15a. CENTRAL BUSINESS DISTRICT

RESIDENTS AT VARIOUS DISTANCES FROM CENTRE OF WORK

DISTANCE TO WORK (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+	TOTAL
NUMBER OF PEOPLE	24	64	320	496	248	48	8	1208
PERCENTAGE	2.0%	5.3%	26.5%	41.0%	20.5%	4.0%	0.7%	100%

TABLE 15b:- EBUNGO INDUSTRIAL AREA
- RESIDENTS AT VARIOUS DISTANCES FROM CENTRE OF WORK

DISTANCE TO WORK (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+	TOTAL
NUMBER OF PEOPLE	144	180	176	216	136	8	84	1208
PERCENTAGE	15.3%	19.1%	18.6%	22.9%	14.4%	0.8%	8.9%	100%

TABLE 15c:- PUGU ROAD INDUSTRIAL AREA

RESIDENTS AT VARIOUS DISTANCES FROM CENTRE OF WORK

DISTANCE TO WORK (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+	TOTAL
NUMBER OF PEOPLE	4	68	84	56	12	16	8	248
PERCENTAGE	1.6%	27.4%	33.9%	22.6%	4.8%	6.5%	3.2%	100%

TABLE 15D: ALL WORKERS INTERVIEWED

RESIDENTS AT VARIOUS DISTANCES FROM CENTRE OF WORK

DISTANCE TO WORK (KM)	0-1	1-3	3-5	5-7	7-79	9-11	11+	TOTAL
NUMBER OF PEOPLE	172	312	580	768	396	72	100	2400
PERCENTAGE	7.2%	13.0%	24.1%	32.0%	16.5%	3.0%	4.2%	100%

TABLE NO. 16: SECONDARY SCHOOL PUPILS

NO. OF PUPILS STAYING AT VARIOUS DISTANCES FROM THE SCHOOL

DISTANCE TO SCHOOL (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+	TOTAL
NUMBER OF PUPILS	28	104	204	260	120	36	96	848
PERCENTAGE	3.3%	12.2%	24.0%	30.7%	14.1%	4.3%	11.3%	100%

The above table reveals that about 20.2% of workers stay between 0-3 kilometres from their employment places. 3 kilometres is just about the maximum distance a worker can travel.[16] Further about 56.1% of the workers stay between (3-7) kilometres from their employment areas.

16. Urban Transportation Sector Policy Paper by World Bank - May 1975 - Page 7b.

7 Kilometres is also just about the range of cycling though in some cases it could go as far as 10 kilometres[17]. Also about 20% of workers stay between 7 - 11 kilometres. And 16 kilometres is about the reasonable maximum distance to have proper public bus system, though in many cities this is overlooked since there is a lot of dispersion in location of activities such that greater distances than 16 kilometres separate activity centres with residential areas. The number of workers staying beyond 16 kilometres are just about 4.2%. It is well known fact that workers staying as far as 20 kilometres can be very well served by private cars, though this is likely to be costly. But in Chapter II it hasbeen noted that most of the peripheral residential areas are of low income group; thus usage of private car is very remote. Therefore public transport in Dar-es-Salaam go as far as 45 kilometre in Kasarawe and Kibaha.

Discussion of modes will be dealt with in the next chapter. Here is where choice of mode will be related to lengths of journey to work.

Most journeys to work in many developing countries are within 13 kilometres (8 miles)[18]. Thus Dar-es-Salaam spatial structure seem to conform with normal standards as far as journey to work

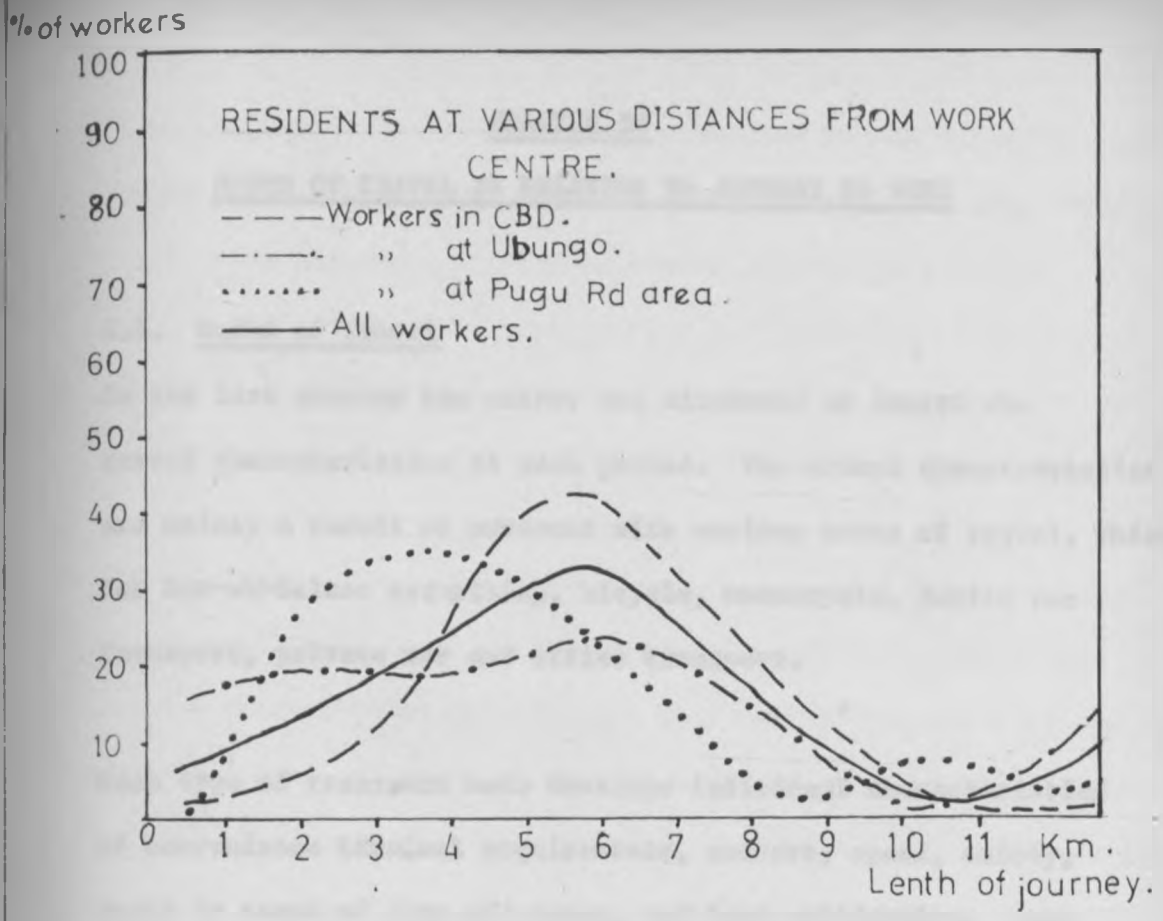
---

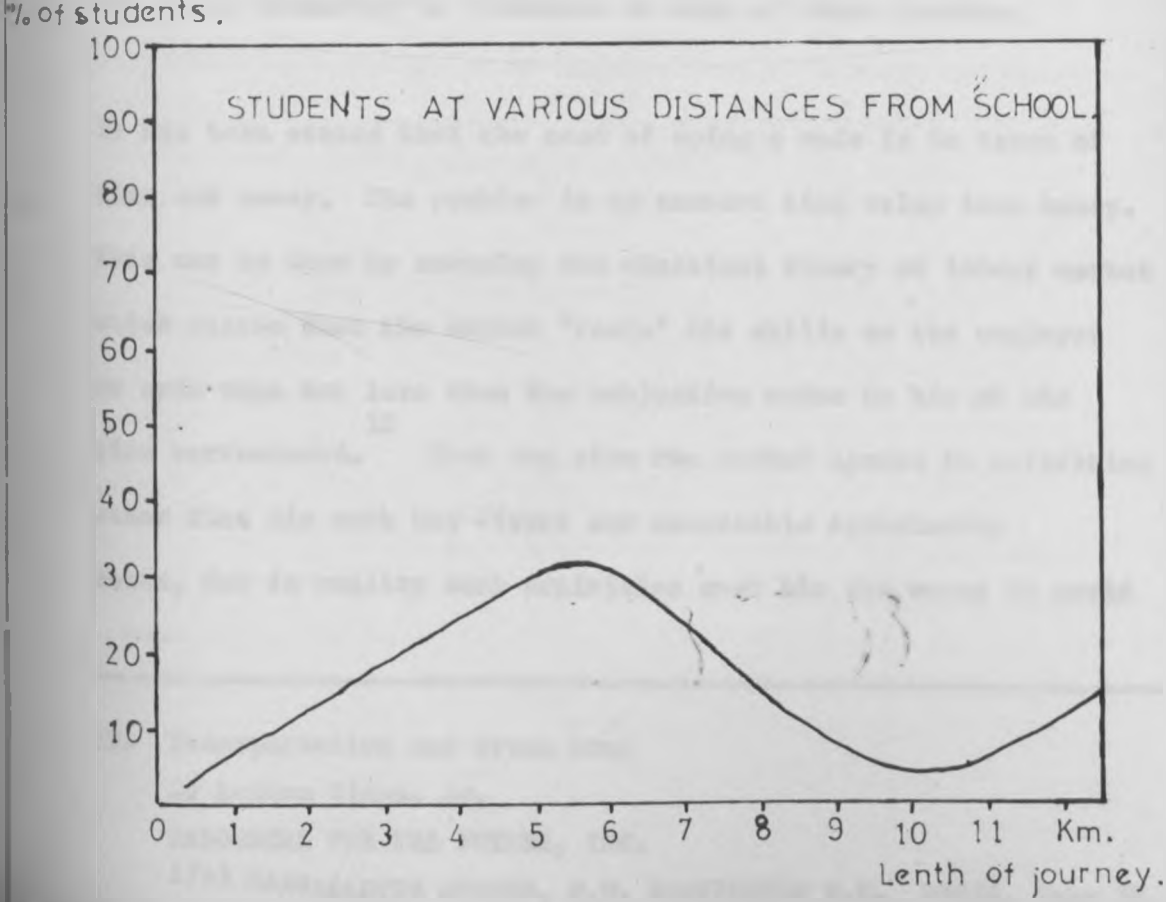
17. Opcit Urban, Transportation Page 76

18. Ibid Page 77

is concerned. Thus the existing travelling problems at peak periods are mainly a result of lack of suitable and efficient modes of travel to work and not the excessive long journeys to work, though if efforts are made to shorten the present journeys to work, some improvements to usage of modes of could be attained.

PLATE 1.


% of workers
RESIDENTS AT VARIOUS DISTANCES FROM WORK CENTRE.
———Workers in CBD.
—·—·— ,, at Ubungo.
····· ,, at Pugu Rd area.
——— All workers.
100
90
80
70
60
50
40
30
20
10
0 1 2 3 4 5 6 7 8 9 10 11 Km.
Lenth of journey.


% of students.
STUDENTS AT VARIOUS DISTANCES FROM SCHOOL.
100
90
80
70
60
50
40
30
20
10
0 1 2 3 4 5 6 7 8 9 10 11 Km.
Lenth of journey.

CHAPTER IV

MODES OF TRAVEL IN RELATION TO JOURNEY TO WORK

4.1. Modes of Travel

In the last chapter the author has discussed at length the travel characteristics at peak period. The travel characteristics are mainly a result of movement with various modes of travel, which for Dar-es-Salaam are walking, bicycle, motorcycle, Public Bus Transport, private car and office transport.

Each type of transport mode develops individual characteristics of convenience terminal requirements, comfort, speed, safety, costs in terms of time and money, and land utilisation. Most of these factors will be discussed separately for each mode. But it is necessary to elaborate on some of these factors.

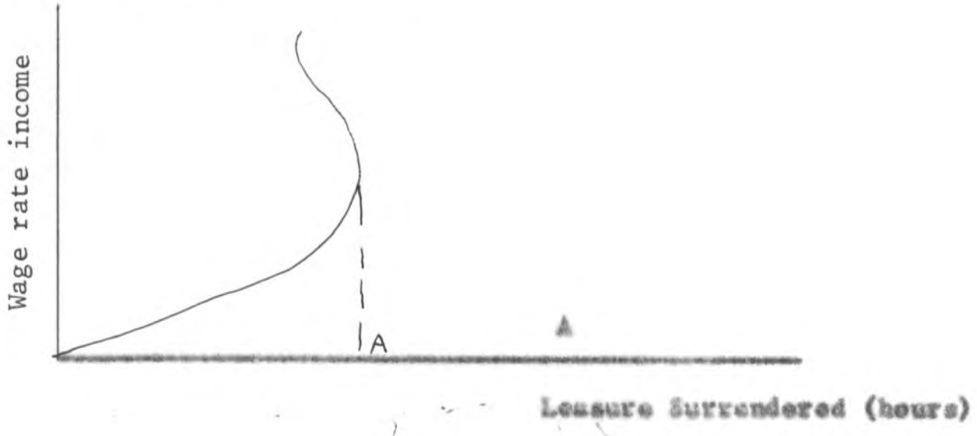
It has been stated that the cost of using a mode is in terms of time and money. The problem is to convert time value into money. This can be done by assuming the classical theory of labour market which states that the worker 'rents' his skills to the employer at some wage not less than the subjective value to him of the time surrendered.[19] Thus the time the worker spends in activities other than his work has direct and assessable opportunity costs, for in reality such activities cost him the wages he could

---

19. Transportation and Urban Land
By London Winge, Jr.
RESOURCES FOR THE FUTURE, INC.
1755 MASSACHUSETTS AVENUE, N.W. WASHINGTON D.C. 20036, Page 55.

marginal value of leisure, which is a level of total satisfaction by an individual in substituting income for leisure. It is assumed that the market behaviour of an individual worker can be described as a choice among combinations of incomes and leasure.

The schematic graph below shows that:-



Source: Transportation & Urban Land
by Wings Jr. Page 56.

have alternatively earned. Thus time-costs can be valued in money terms and added with direct costs into a single work trip "price". This being the case, in time of choice of mode or location either time or money or both governs the behaviour of an individual. Money is likely to be the binding constraint for low income groups, while time will be for the upper income group.

In this text it is considered better to illustrate the mechanism by which the time spent in the journey to work enters into the market processes establishing the wage rate or the price of the workers' time in order to support a single currency formulation of the time costs of transportation. First we have to look at the

(i) The gradient is positive from zero implying that time is valuable to the worker.

(ii) It is concave upwards to reflect the principle of diminishing marginal utility - the more leisure one has the less valued is the last hour of it and conversely.

(iii) At point A the marginal hour will be so highly valued that it cannot be bought.

So it follows that the amount of worker's input into the production processes is equal to the amount of leasure time he gives up. In practice the worker gives up more leasure time than he puts into work and the difference is the time spent on the journey to work.

The other aspect of importance in connection with usage of various travel modes is the comparison of the effectiveness of different modes of transport based on the area required per person (A) for a journey of 1 km at the maximum hourly capacity for the system.

The formula is $A = \frac{W \times 1000}{C \times p}$ [20]

Where W = Width of track occupied by selected mode (m)

C = Capacity in veh/hour.

p = Occupancy of vehicle in persons/vehicle.

The required values for A for normal standards is shown on Table 17.

---

20. Traffic Planning & Engineering by F.D. Hobbs. Pergamon Press - 1974 Page 35.

TABLE NO. 17 - AREA REQUIRED FOR TRAVEL BY DIFFERENT MODES AND DIFFERENT ROAD CAPACITIES

TYPE OF ROUTE	CAPACITY pec/h/lane	AREA REQUIRED FOR TRAVEL			
		Driver only	p =1.3	p=4	P
Central Area 2 or 3-lane	500	7.3	4.86	1.82	∞
Urban Motorway	2,400	1.52	1.0	0.29	∞
Footway			0.3		

Source: Traffic Planning & Engineering
By F.D. Hobbs - Page 36.

The above table indicates the needfulness of buses for urban transportation because there is no misuse of urban roads. The value of P tends to a very big number thus reducing the value of A to almost zero (the case for buses when they operate at full capacity).

Road misuse is displayed by private car usage in the central area where p = 1.3 and the area required is about 4.86. The value of A displayed by foot way as 0.3 is another non-misuse of urban roads. Also the expected low value of P for bicycles indicates that cyclists are also potential useful users of urban roads if facilities are available.

In this study it was intended to determine the choice of mode of travel to work in percentages. The result of the the study is shown on Table No. 17. Figures for previous years are also indicated.

TABLE NO. 18 - CHOICE OF MODE OF TRAVEL TO WORK IN DAR-ES-SALAAM (PERCENTAGES)

MODE	(i) 1965	(ii) 1968	(iii) 1975	(iv) 1980	(iv) 1985	(iv) 1990
Walking	66.9	67.8	26.3	—	—	—
Bicycle	11.9	8.5	0.0	15	15	15
Motorcycle	1.3	—	1.0	—	—	—
Public Bus	13.2	20.2	57.7	60	60	60
Private Car	2.2	3.5	13.0	—	—	—
Office Transport	4.5	—	—	—	—	—

Source: (i) A study made in Dar-es-Salaam by Micro Surveys of Nairobi - 1965

(ii) Dar-es-Salaam Master Plan - 1968

(iii) Sample Survey by the Author - 1975

(iv) Author's Projections

The result indicate an increasing number of Public Bus and office transport users, while there is a decrease on the number of pedestrians and cyclists. Usage of private car is not encouraging either.

Therefore the result implies that public bus transport should be improved to cater for people efficiently and improve facilities

for other modes so that people can be diverted from using public transport since the services offered by public bus service may reach a point of saturation - particularly under inadequate road facilities.

4.2. Walking

Walking as a travel mode is more significant in the CBD. At least everyone in the city must be involved in walking in one way or another. Thus in Dar-es-Salaam we find:

(i) People walking straight from their home places to their work places.

(ii) People walking from their offices or homes to bus stops to catch buses.

(iii) People walking from offices to where their private cars or motorcycles are parked.

(iv) Pedestrians within the city core involved in various activities.

A survey carried out by the planners who prepared the Dar-es-Salaam Master Plan 1967 indicated that within 24 hours period the pedestrian traffic was as shown on table No. 21. Projections where necessary, have been made for subsequent years up to 1990 for the peak period hour pedestrian traffic.

TABLE NO. 19 - 24HOUR FOR PEDESTRIAN TRAFFIC ON SOME MAJOR ROADS - 1968

	ROAD	NO. OF PEDESTRIANS
1.	Morogoro Road	17,967
2.	Pugu Road (East of Chang'ombe Road)	12,220
3.	Uhuru Street (East of Mainbasi Street Intersection)	10,564
4.	Lindi Street (East of Mainbasi Street Intersection)	6,476
5.	Gerezani Street	5,305
6.	Kilwa Road	4,504
7.	Bagamoyo Road	1,903

Source: Dar-es-Salaam Master Plan - 1968

TABLE NO. 20 - PEAK PERIOD PEDESTRIAN TRAFFIC ON SOME MAJOR ROADS

ROAD	I 1968	1975	IV 1980	IV 1985	IV 1990
Morogoro Road	1,630	II 2,215	2,700	3,310	4,200
Pugu Road	1,740	III 1,960	2,370	2,900	3,680
Bagamoyo Road	186	IV 230	278	342	435
Uhuru Street	1,035	III 1,620	1,950	2,380	3,010
Kilwa Road	387	480	590	710	900

Source: I Projections assuming the Master Plan Survey

II Survey done by National Transport Corporation - 1974

III Projections assuming the population in these areas as per Lewiconsult Report Map No. 11

IV Projections assuming the traffic increase as projected in table No. 12

The figures in Table No. 20 implies that there is an immediate attention needed in providing for pedestrian tracks on Morogoro Road, Fugu Road [21] and Uhuru Street since by 1990 the pedestrian traffic will have doubled.

Walking in cities is catered by pedestrian footpaths. As already found out a foot path can carry more people per foot of width in an hour than any other forms of track except exclusive bus track. About 1,100 persons can be accommodated at an average speed of 3.4 kilometres an hour, and as many as 1,200 persons can be accommodated at a speed around 2.4 kilometres an hour. Pedestrians can walk very close to each other even in opposite directions, make turns or stop without seriously interferring with flows.

Walking has various disadvantages:- It is characterised by low speeds about 4.8 kilometres an hour; comfort in hot weather or rain is poor; in crowded conditions speeds and flows may be substantially reduced and discomfort raised. Because of low speeds and fatigue pedestrian trips are limited to about 3 kilometres particularly for poorer communities like Dar-es-Salaam.

In terms of money cost, walking becomes the cheapest mode of travel. Practically there is no fare involved except energy lost.

---

21. Information obtained from the Zonal town planner Dar-es-Salaam indicated that Fugu Road already has this facility, including cycle tracks.

Even the construction of the pedestrian foot paths is cheap as compared to construction costs of vehicular roads. On the other hand, in terms of time costs, walking can be expensive particularly when the distances walked are longer than anticipated in planning standards.

Of the people interviewed in Dar-es-Salaam (3% of the Dar-es-Salaam labour force) 26.3% indicated that they walked from home to their places of work. The distribution of the percentage in terms of length of journey is shown on table No. 21.

TABLE NO. 21 - DISTRIBUTION OF PEDESTRIANS AS RELATED TO LENGTHS OF JOURNEYS TO WORK

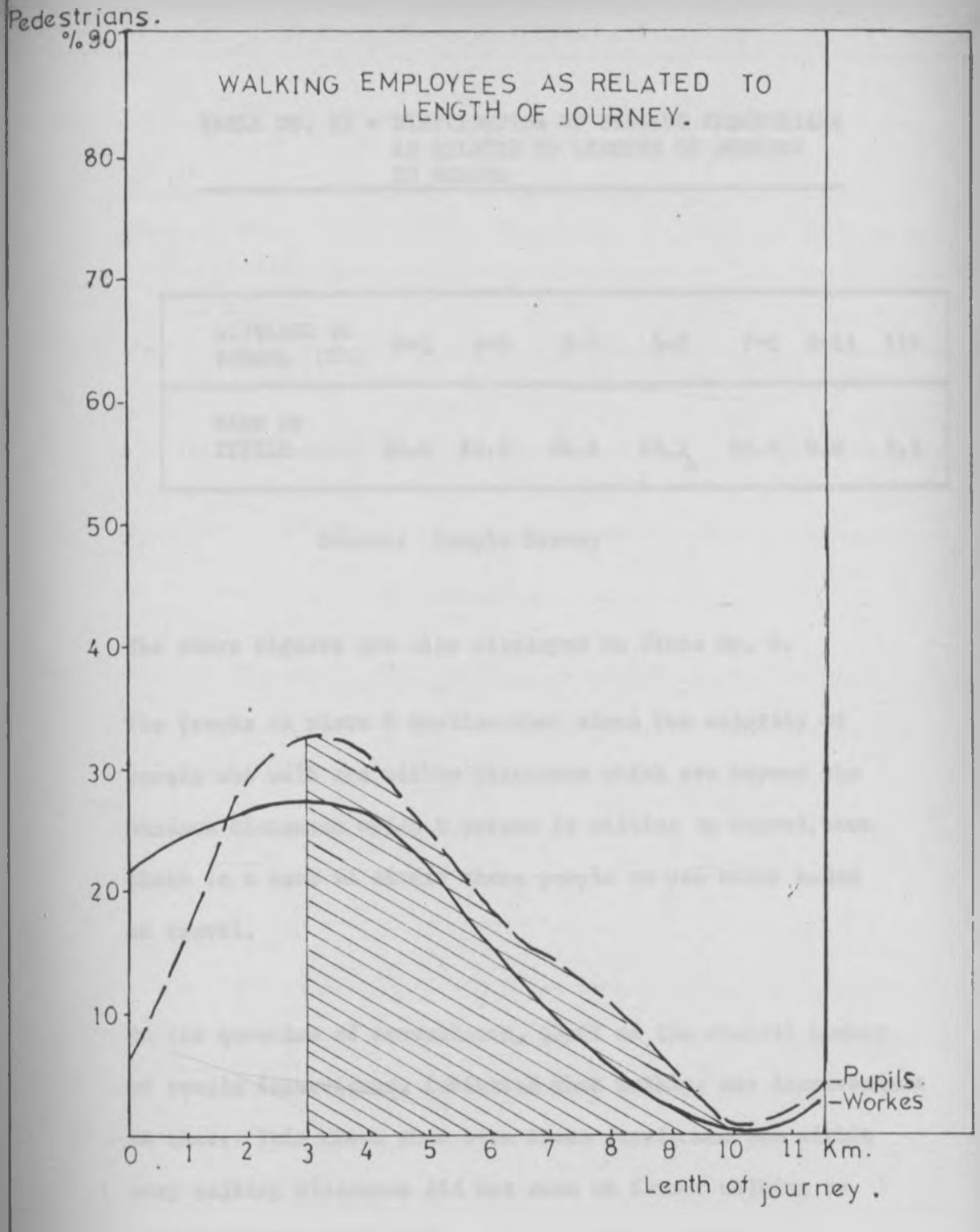
DISTANCE TO WORK CENTRE (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+
%AGE OF PEDESTRIANS	24.0	26.6	26.6	15.2	6.3	0	1.3

Source: Sample Survey

The table is displayed on Plate No. 2, assuming a maximum distance which a worker is willing to walk to be 3 kilometres, then more than 50% of those who walk found to walk longer distances than 3 kilometres so that they have to spare more of their leisure time and use it for walking so that they can be on time at their places of work.

The distribution of students who walk to school by percentages is shown on Table No. 22.

PLATE 2.



Workers walking distances beyond comfortable walking distance.

TABLE NO. 22 - DISTRIBUTION OF STUDENT PEDESTRIANS AS RELATED TO LENGTHS OF JOURNEY TO SCHOOL

DISTANCE TO SCHOOL (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+
%AGE OF PUPILS	10.0	28.8	30.4	18.1	10.6	0.0	1.5

Source: Sample Survey

The above figures are also displayed on Plate No. 2.

The fraphs on plate 2 implies that since the majority of people who walk are within distances which are beyond the maximum distances which a person is willing to travel, then there is a need to divert these people to use other modes of travel.

On the question of convenience, 57.0% of the overall number of people interviewed, indicated that walking was inconvenient to them. This shows that even those people who are within easy walking distances did not seem to favour walking as a mode of travel to work.

Further information concerning people's monthly incomes was related to choice. The results are shown on Table No. 23.

TABLE NO. 23 - WALKING AS RELATED TO INCOMES

Incomes/Month	Sh.0 -380	Sh.381-750	Sh.751-1500	Sh.1501-2500	2500/-
Number Walking	192	392	40	8	0
Percentage Within Mode	31.0%	62.0%	6.0%	1.0%	0.0%
Percentage Overall	8.0%	16.3%	1.7%	0.3%	0.0%

Source: Sample Survey

Table No. 23 reveals that the biggest percentage of pedestrians is found where the monthly incomes are between 380/- and 750/-. This indicates that apart from short distances, walking is prevelent among the low income group.

4.3 Bicycle

In this study time did not allow the author to make a survey on bicycle ownership in Dar-es-Salaam. Even if the survey was done it would not be easy since bicycle ownership is not licenced in Tanzania. However from the master plan it is believed that there were about 30,000 bicycles in 1967. Assuming that the bicycles in Dar-es-Salaam would increase according to the population increase, the projected bicycle ownership in subsequent years is shown on table No. 24.

TABLE NO. 24 - PROJECTED BICYCLE OWNERSHIP

YEAR	1967	1970	1975	1980	1990
NUMBER OF BICYCLES	30,000	41,500	60,000	80,000	130,000

It is very unlikely that the number of bicycles will increase as projected since most workers do not seem to favour bicycle usage (See table No. 25).

The Tanzania government has tried to induce bicycle ownership by giving loans to workers to purchase bicycles. Further a bicycle factory is being constructed at Mwenge on Bagamoyo Road in Dar-es-Salaam. The factory is expected to operate before the end of June 1976 by producing 150,000 bicycles a year[22]. With this inducement there seem not to have been any exceptional increase in bicycle usage. The reasons are that cycle riding is increasingly hazardous such that workers are not willing to risk their lives at the expense of being on time at work. Also it seems people do not favour to use bicycle because of prestigious reasons. Thus this cheap and potentially very important mode of travel tends to be grossly underutilized.

Considering costs, cycle tracks are inexpensive to build.

---

22. Daily News of Dar-es-Salaam, August 7, 1975.

They can achieve a flow of persons per foot-width of about half that of pedestrian footway[23].

At speeds of about 13 kilometres per hour, the total hourly output of travel produced by this track i.e. the product of flow and speed can reach 3,600 persons per foot-width. This level of efficiency easily exceeds that of automobiles. There is very low operating costs on bicycles. The only costs are the lost of energy and repairs. Parking and other requirements are negligible as compared with motorised traffic. The range of cycling is probably about 7 kilometres to 10 kilometres. This is sufficient for most journeys to work in Dar-es-Salaam.

Of the people interviewed in Dar-es-Salaam only 2 people indicated that they used bicycles to work. This was about 0.01% of the sample. Since the computer was neglecting all percentages less than 0.1% then bicycle users to work have been denoted as 0% of the total number of people interviewed. This is an indication that people do not favour cycling as a means of travel to work. To investigate further a question was asked:- "Why don't you own a bicycle?" (See appendix No. 1). Of all the people interviewed 300 people who are equivalent to about 13% of the total, indicated that they did not like to use a bicycle because it was a risky affair in the roads of Dar-es-Salaam. Table No. 22 shows reasons for not owning a bicycle percentagewise.

---

23. OPCIT
Sector Policy Paper by World Bank - Page 76.

TABLE NO. 25 REASONS FOR NOT OWNING BICYCLE

Reason	Risk	Lack of money	Other Reasons
Xage	13%	73%	14%

The table reveals that 13% are likely to be potential bicycle users if proper bicycle facilities were available on the city road. The 73% is unjustifiable because the government issues loans for bicycle purchase, and the payment is about Sh. 20/- a month which is far less than the average amount of fare one has to pay for the bus per month.

Furthermore, the fact that the majority of workers are within good cycling distances then with proper bicycle planning more people can use bicycles.

On the number of students interviewed the result indicated that cycling was also uncommon among students.

4.4. Public Bus Transport:

By the time this study was done there were two companies in operation:- UDA (Usafiri Dar-es-Salaam) and Co-Cabs. In addition to records obtained from various reports concerning UDA (formerly DMT), several visits were done to UDA offices at Kurasini Depot. Some information concerning Number of Buses existing, bus routes, frequencies and utilisation were obtained.

Co-Cabs was given a temporary licence to operate in the city in 1974, when it was found out that UDA was failing to offer reasonable services to the public. It is a company of a group of individuals thus it cannot be allowed to continue for a long time since the government policy is to discourage such organisations which are not affiliated to it. However, Co-Cabs' services were and are still appreciated very much by the people though it had only 9 medium sized buses. Interesting to note is the fact that though Co-cabs supplemented services which should have been offered by UDA, still UDA management did not seem to favour the existance of Co-cabs on the pretext that UDA was loosing revenue.

UDA and Co-Cabs are examined together in this study because they serve the people in the same way and have similar planning implications.

UDA is a subsidiary of NTC (National Transport Corporation). It was founded in 1949 as a British Firm by the then called DMT (Dar-es-Salaam Motor Transport). In 1965 the then Dar-es-Salaam City Council took over 25% of the shares of the company until 1970 when it was fully nationalised by the government of Tanzania. The change of the name from DMT to UDA took place in 1973 when two companies emerged from it:- UDA and NBC (National Bus Service) dealing with upcountry buses alone.

By the time of Nationalisation, 31st March, 1970, 115 buses were in operation in the City of Dar-es-Salaam (and 26 on up-country routes).

When this study was carried out in August 1975, UDA had 374 buses but only 138 were in operation. The UDA officials explained that those buses which were not in operation were out of order while about 39 buses were waiting for the completion of the new workshop at Ubungo. Table No. 26 shows the number of buses, passengers carried, revenue collection and distance moved in previous years.

TABLE NO. 26 - NUMBER OF BUSES IN UDA (DMI)

Year	No. of Buses Existing by December	No. of Buses Operating	Average No. Of Passengers Carried per Day	Revenue Per Day Shs.	Daily Effective Distance Travelled In Miles
1967	82	74	—	—	—
1970	127	115	162,683	82,205	16,461
1971	149	—	188,731	67,755	18,338
1972	199	—	216,516	79,067	31,330
1973	216	129	222,506	82,405	31,330
1974	259	—	221,403	116,903	30,283
1975*	374	138	279,568	—	29,453

Sources: From UDA offices.

* Figure for 1975 only goes up to July. The mileage for 1974 and 1975 does not include private hire.

The data on passengers does not include those with seasonal tickets.

The factors to be noted from Table No. 26 are that though the number of buses have increased year after year, still those buses which were in operation were far less than the number of buses expected to operate. In some cases buses were even less than in the previous years. Further information reveals that number of passengers have increased while number of buses were even less than in previous years. Also it is revealed that neither had the revenue collected from the receipts increased with the increased number of passengers. So under these irregularities probabilities of inefficiency are higher thus poor services offered.

UDA has a wide range of buses with various characteristics. These are shown on table 27.

TABLE NO. 27 - EXISTING BUS FLEET - 1975

Make	Price	Life in Years	Fuel Consumption	Capacity (Full)	No.
Leyland Albion	174,533/- (Sep 1974)	8	2.4 km/litre	130+ Pass.	108
Mercedec Benz	91,720/- (May 1972)	6⅔	2.5	130+ "	66
Fiat	209,930/- (Sep 1974)	8	1.8	130+ "	67
Ikarus (280)	410,000/-	5	1.7	200+ "	32
Ikarus (266)	280,000/- (Jan 1975)	5	2.2	120+ "	51
Isuzi (Minibus)	70,000/- (Oct 1974)	4	5	35+ "	50
TOTAL					374

Source: UDA Management - Dar-es-Salaam.

Looking at the advantages and disadvantages in terms of road facilities, passengers convenience and the management, one finds that Leyland Albion, Mercedes Benz and Fiat are better than the Ikarus. The Ikarus buses are favoured by the management for their high capacities and they seem to have contributed in lessening the inefficiencies, but they are likely to get broken very quickly. The minibuses are suitable for quick journeys and are able to even penetrate the city core where the big buses cannot pass conveniently.

The existing bus routes (see Map No. 12 & 13) seem to have been planned properly inspite of the fact that the people seem to be dissatisfied with the services offered. The route penetrate through all the major residential areas and ends in the city centre, but there are fewer circumferential links between residential areas and employment areas which are at a distance away from the core. The newest residential areas like Tabata East or West do not have better bus services. Their population densities are too low however.

Because of streets in the core being narrow the bus routes are among the streets of severe traffic congestion. There is thus a need to convert some bus routes into one way for buses only.

It was not possible in this study to conduct a survey of buses in order to determine frequencies, however the study done by Coviconsult on DaT in 1973 made a survey of the number of buses per hour passing check points at the main roads. Table No. 28 shows this result.

DAR ES SALAAM.
Existing Public Bus Routes.

SCALE: 0 1 2 3 4 Km.

SOURCE: UDA Management.

AR Omari;
DEPT OF URBAN
&REG PLANNING;
UNIVERSITY OF
NAIROBI. 1975/76.

12.

DAR ES SALAAM.
Central area Public Bus Route.

SCALE:
0 15 3 Km

A.R. Omari.
DEPT. OF URBAN & REG. PLANNING; UNIVERSITY OF NAIROBI;
1975/76.

13

TABLE NO. 28 - NUMBER OF BUSES PER HOUR PASSING CHECKPOINTS AT THE MAIN ROADS

	Upanga		Morogoro		Pugu		Kilwa		Uhuru	Total
	In	Out	In	Out	In	Out	In	Out	Out	Out
6.30 - 7.30	19	17	41	45	34	26	7	5	17	110
7.30 - 8.30	24	24	35	41	27	25	6	9	17	116
8.30 - 9.30	17	10	31	31	21	26	8	5	18	90
9.30 -10.30	16	15	28	29	21	22	6	3	15	84
10.30 -11.30	15	13	28	38	23	31	4	7	13	102
11.30 - 12.30	11	13	34	32	24	19	6	6	12	92
12.30 - 13.30	16	12	29	27	18	25	n.a	n.a	16	80
13.30 - 14.30	10	14	28	34	26	25	-	3	17	93
14.30 - 15.30	12	14	28	31	22	17		8	19	89
15.30 - 16.30	13	10	26	36	20	17		6	12	74
16.30 - 17.30	7	14	24	29	29	25		5	16	89
17.30 - 18.30	14	12	24	26	25	20		6	18	82
Planned No. at Peak Hour	24	24	44	44	32	22	9	9	20	189

Source: Coviconsult Report - 1973

On the whole the number of buses passing were far below the planned peak hour number. However, when UDA management were interviewed during this study, it was revealed that 170 buses were supposed to operated as such UDA was operating with a deficit of buses.

Assuming that the number of buses needed to satisfy the demand on each radial road depend on the modal split, then the projected peak hour bus traffic is shown on table No. 29. Also estimated bus frequency is shown on table No. 30.

TABLE NO. 29. PROJECTED PEAK HOUR BUS TRAFFIC REQUIREMENTS

ROUTE		NO. OF BUSES REQUIRED AT PEAK HOUR				
		1973	1975	1980	1985	1990
1. Morogoro Road	In	38	92	114	140	178
	Out	38	92	114	140	178
2. Pugu Road	In	42	67	83	102	130
	Out	42	67	83	102	130
3. Upanga (Bagamoyo) Road	In	31	49	61	75	95
	Out	31	49	61	75	95
4. Uhuru Road	In	--	--	--	--	--
	Out	26	41	51	63	80
5. Kilwa Road	In	15	24	30	37	47
	Out	15	24	30	37	47
Total No. of buses 'out' at peak hr.		172	273	339	417	530

Source: Author's projections assuming the modal split shown on Table No. 18 and the projected labour force on Table 15.

TABLE NO. 30 - PROJECTIONS OF AVERAGE BUS FREQUENCY AT PEAK HOUR (TIME TAKEN FOR THE NEXT BUS STOP)"

FREQUENCY IN MINUTES

ROUTE	YEAR	1973	1975	1980	1985	1990
Morogoro Rd.	In	1.0	0.7	0.5	0.4	0.3
	Out	1.0	0.7	0.5	0.4	0.3
Fugu Road	In	1.4	0.9	0.7	0.6	0.5
	Out	1.4	0.9	0.7	0.6	0.5
(Bagamoyo Rd) Upanga Road	In	2.0	1.2	1.0	0.8	0.6
	Out	2.0	1.2	1.0	0.8	0.6
Uhuru Street	In	--	--	--	--	--
	Out	2.3	1.5	1.2	1.0	0.8
Kilwa Road	In	4.0	2.5	2.0	1.6	1.3
	Out	4.0	2.5	2.0	1.6	1.3

Source: Author's projection from table No. 29

The above tables show how UDA will not be able to manage the
The table
frequency unless the roads are widened, other modes of travel are
substantially promoted and employment centres decentralised.

The aim should be to keep the model split for buses at 60% from now onwards. Thus the number of buses to be used by UDA in subsequent years are shown on table No. 29.

Public bus transport is the mostly used mode of travel to work as can be noted that 57.7% of the people interviewed used public bus transport.

Buses are next to cyclists and pedestrians in the economic use of the road space, particularly when they move under full capacity - see Section 4.1.

In terms of money and time the public bus transport can be considered as moderate providely there is no congestion. Factors which cause congestion are stated in Chapter 5. The fare structure in Dar-es-Salaam per month ranges between 60/- to 80/-[26]. This is not likely to be afforded by every worker particularly those earning around Sh. 300/-. Other costs are on the side of the operators. These are labour, administration and maintenance. There is a total of 50 to 75 cents a vehicle-mile or a little below 2 cents per passenger mile are typical in many developing countries.[27] Parking costs are low as compared to other cars.

---

26. UDA Management

27. Opcit - World Bank Paper 78

Buses are particularly suitable for services along heavily populated corridors where reasonably full loads at short frequencies of services can be obtained. However under poor scheduling public bus transport can be time consuming, particularly on waiting at bus stops.

In the study it was necessary to find out people's opinion concerning Public Transport. The workers were asked to write down problems they faced in travelling with public buses. These problems were categorised as shown below and the results are also indicated:

Fare (high)	27.7%
A lot of time spent on the stage	79.2%
A lot of time spent on the way	34.1%
Last stage to off	2.3%
Inconvenience	64.2%

Inconvenience on bus users as it was found out in the questionnaires was caused by the following factors:- Buses full beyond capacities, poor frequency, buses passing over stations where people are supposed to drop, rudeness of conductors and drivers, fighting on bus stops in order to catch a bus when it arrives, conductor's machine out of order, and constant breakdowns of buses.

A 27.7% of people complaining of fare being high is an indication that though many writers argue that fare on public bus is the

biggest problem workers in Dar-es-Salaam seem to be more concerned with other problems.

A 79.2% of people complaining about more time spent on the stop reveals poor scheduling of buses and may be explained by inadequate number of buses.

The people complaining about a lot of time spent on the way, were 34.1%. This tells that traffic congestion on the roads is moderate at least as viewed by bus users. Of course lengths of journeys can help to explain this.

There were few people complaining of long walking distances from home to bus stops or from office to bus stops. The percentage was 2.3%. This is an indication that routing of the bus routes is quite adequate.

64.2% of people complaining of convenience is an indication that UDA requires to train their workers and also have an effective central system.

Bus users were also related to their incomes. Table No. 31 shows how incomes affect bus users.

The table reveals that a large percentage of the workers who use public bus are within the low income group.

TABLE NO. 31 - PUBLIC BUS USERS AS RELATED TO INCOMES

Income (Sh./Month)	0 - 380	381-750	751-1500	1501-2500	2500
No. Using Public Bus	334	928	96	24	0
% Within Mode	24.3%	67.0%	6.9%	1.8%	0%
% Overall	14.0%	38.7%	4.0%	1.0%	0.0%

Source: Sample Survey

TABLE NO. 32 - PUBLIC BUS USERS AND LENGTH OF JOURNEY

Length of Journey (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+
Percentage of Bus Users (Workers)	0.6%	4.0%	22.3%	41.0%	22.0%	4.0%	5.8%

Source: Sample Survey

On the length of journey it was found out that the majority of bus users were within intermediate distances. Table No. 32 shows the relationship between Public bus users and length of journey.

For reasonable planning standards in order to have proper bus frequency the maximum distances to work should be about 16 kilometres for bus users. This includes distance travelled by bus and that

which the worker walks from his home to bus stop or from his office to bus stop. The maximum walking distance to the bus stop should be 15 minutes. Presently for Dar-es-Salaam it is 10 minutes or less while for western countries it is 5 minutes[28]. In this respect Dar-es-Salaam is somehow alright.

Of the number of students interviewed more than half used public buses to school. The percentage was 59.0% for public bus users. The distribution is shown on table No. 33.

TABLE NO. 33 - RELATIONSHIP BETWEEN STUDENTS WHO USE PUBLIC BUS AND THE LENGTH OF JOURNEY

Length of Journey (KM)	0-1	1-3	3-5	5-7	7-9	9-11	11+
Percentage of Bus Users (students)	0	0.9	27.4	46.0	3.0	8.1	8.8

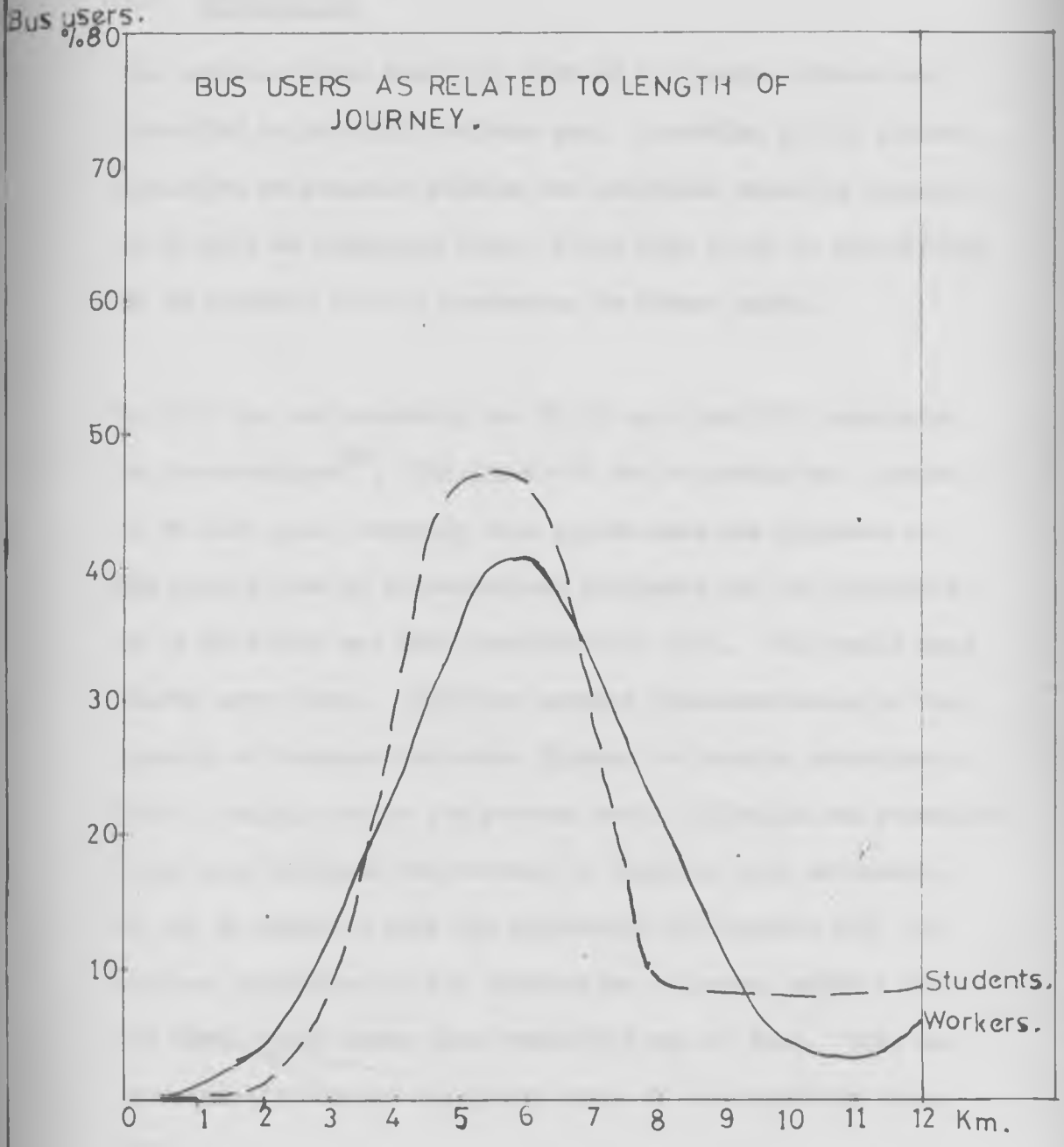
Source: Sample survey.

The results of tables No. 32 and No. 33 are shown on Plate 3.

---

28. Dodoma Master Plan Page 53.
By Project Planning Associate - Toronto - 1975.

PLATE 3.


Bus users.
%80
BUS USERS AS RELATED TO LENGTH OF JOURNEY.
70
60
50
40
30
20
10
Students.
Workers.
0 1 2 3 4 5 6 7 8 9 10 11 12 Km.

4.5 Private Car

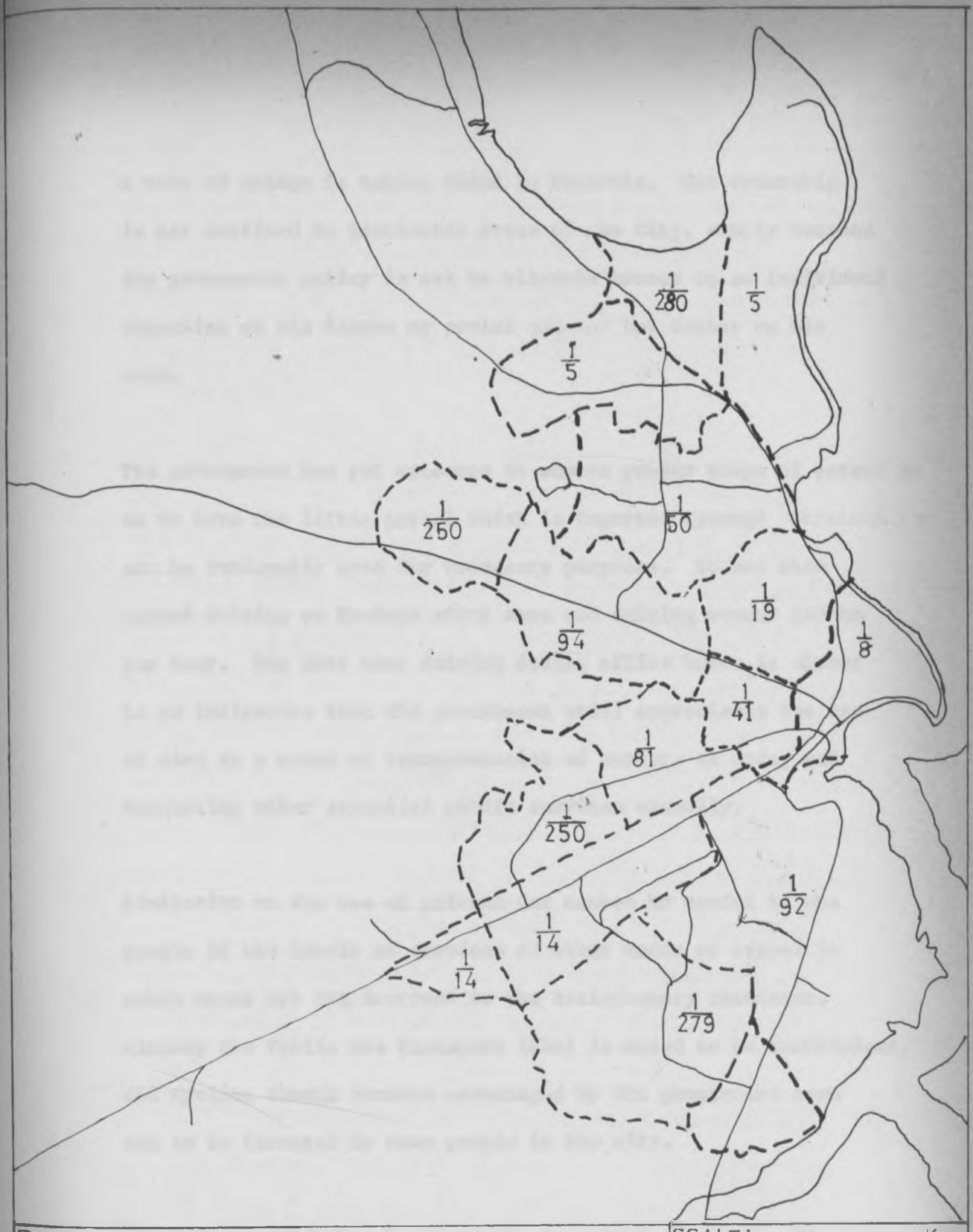
The analysis shows that only 2.0% of the people interviewed travelled to work with private car. According to the present situation on economic affairs and political stand in Tanzania, as it will be discussed later, there seem to be no possibility of an increase in that percentage in future years.

In 1967 the car ownership was 29.1% cars per 1000 population in Dar-es-Salaam[29]. The growth of car ownership was assumed to be 3.0% p.a. Assuming this growth rate the planners of the master plan of Dar-es-Salaam projected the car ownership to be 55.8 cars per 1000 population by 1989. This would mean 54,000 motor cars. Following present characteristics on the economy of Tanzania the above figures is totally unrealistic. This is mainly due to the present world inflation and recession which have affected the economy of Tanzania very seriously. To try to overcome this the government of Tanzania has put serious limitation on the importation of luxury private cars and their spare parts plus controlled use of fuel. This has tremendously reduced the growth rate of car ownership since 1971.

Areas in Dar-es-Salaam which had a high level of car ownership in 1967 were Oyster Bay, Regent Estate, City Centre, Chang'ombe, Upanga and Kurasini (Map No. 10 shows car ownership in 1967).

---

29. Opeit - Dar-es-Salaam Master Plan - Page 16



DAR ES SALAAM.
Car Ownership.

SCALE: 0 1 2 3 4 Km.

SOURCE: DSM Master Plan 1967.

LEGEND.

1/94 One Passenger Car. 94 Persons.

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI. 1975/76.

Limitation on the use of private car cannot be useful to the people if the levels of services of other modes of travel in urban areas are not improved to the satisfactory standards. Already the Public Bus Transport (UDA) is noted to be inefficient, and cycling though somehow encouraged by the government seem not to be favoured by many people in the city.

Tanzania though having realised the importance of saving foreign currency for necessary items have continued importing luxury cars for senior government officers as "office transport". The volves and 504s are some of the expensive cars in developing countries, in terms of their prices, spare parts and petrol consumption.

A wave of change is taking place in Tanzania. Car ownership is not confined to particular areas of the City, simply because the government policy is not to allocate houses to an individual depending on his income or social status but rather on his need.

The government has put measures to ensure proper usage of petrol so as to have the little petrol which is imported through straints can be rationally used for necessary purposes. It has thus banned driving on Sundays after noon and driving beyond 100 km per hour. The fact that driving during office hours is allowed is an indication that the government still appreciates the use of cars as a means of transportation of workers to work, and conducting other essential public services speedily.

Cars such as Volkswagon, Renault and Mini Morris are some of the very cheap cars in terms of their prices and petrol consumption. If Tanzania embarks on the use of cheap cars in urban areas it will find that the limitation imposed can be made flexible.

A car is relatively expensive in terms of road space used. The flow of persons an hour per metre width of road is well below other modes. This is because a car while requiring only about a third of the road space of a bus in congested conditions, comes very much less than a third of passengers. Even though the car travels almost twice as fast as a bus on congested roads, this is not sufficient to offset the difference in load carried. Total passenger distances achieved in an hour are well below those of buses. On an urban express way the high speeds and separation of traffic permit the hourly passenger-miles achieved by cars per metre-width to rise several fold but a bus using the express way will achieve a similar increase.

Operating costs depends on number of passengers carried and speed. The average occupancy of most cars is about 2 persons/ vehicle. This is very low as compared to buses. In fact it counter balances the benefits achieved by high speeds. Maintenance costs for ordinary people range between 250/- to 550/- per month (this is from experience). Under such cost, low income earners cannot at all afford to own cars. The distribution of car usage and income is shown on table No. 34, and it indicates clearly that car ownership is a factor of high income.

TABLE NO. 34 CAR USAGE AS RELATED TO INCOME

Incomes Sh./Month	0-380	381-750	751-1500	1501-2300	2300+
No. Using Private Car	0	0	24	8	16
Percentage Within Mode	0%	0%	50%	16.7%	33.3%
Percentage Overall	0%	0%	1.0%	0.3%	0.6%

Source: Sample Survey

Concerning length of journey it has been identified that car usage has no positive correlation with length of journey. In fact some people staying very close to their place of work use cars (See Table No. 35).

TABLE NO. 35 : DISTRIBUTION OF CAR USAGE AND JOURNEY LENGTH

Distance to Work Centre	0-1	1-3	3-5	5-7	7-9	9-11	11+
Percentage of Number of Cars Used	16.6	16.7	16.7	33.3	16.7	0.0	0.0.

Source: Sample Survey

Table No. 35 helps to explain how it is difficult in Tanzania to run a car for long distances. In fact people staying at distances about 16 km. from their employment areas will favour to use public bus rather than private car because of operating costs for cars.

On problems associated with usage of car it has been revealed that most people complain of constant breakdowns, expensive spare parts, absence of spare parts and expensive petrol. In fact some people feel they should give up car ownership. It should however be noted that misuse of cars is very common. This means that car owners use their cars more for luxury activities rather than for essential duties.

4.6 Office Transport

Office transport is the cheapest mode of transport for the workers. Its limitations are that only a group of people are entitled to use them. Such tptype of transport in Tanzania is used by workers in the productive parastatal organisations and also by senior officers in the government institutions and government ministries.

Looking at the policy of Tanzania of equality then one finds that giving free transport to some workers while leaving others pay for their transport violates the policy of equality particularly when almost all the employment sectors are under the government. According to the officials of the office of the Registrar of Cars, all parastatal organisations are permited to purchase cars, buses

or vans to transport their workers to work, as long as they are financially sound to do so. Government ministries are not allowed to do that.

From the interviews and records of the car registration centre it was possible to estimate the percentage of workers using free transport. This was found to be 13.0%. It is very logical to believe that this percentage will increase since there are certain institutes which are allowed to buy buses for their workers but which have not yet done so.

To find out the problems associated with office transport, people were asked to state the problems they faced. 15.4% of those who used office transport complained of inconvenience while 9.0% compalined of more time spent on the way. Otherwise there were no other complaints. These complaints are mainly due to the fact that since the office transport moves from house to house it forces some workers who live relatively closer to their working places to spend more time in the bus since the bus will always circulate throughout the city taking people living furthest away from their place of work.

One of the companies visited which offers office transport was T.C.C. (Tanzania Cigarette Company). At that time there were about 885 workers and 5 buses. This meant about 178 workers per bus. Workers and the management were found to be very contented with the state of affairs. Another factory visited by the author was Urafiki Textile Company. There were about

5,000 workers and no buses for the workers; instead houses are provided near the factory regardless of workers salaries or status. Those who do not get houses stay within the nearby residential areas of Ubungo, Manzese, Mabibo and Kagera. There were no much complaints from the workers of this factory. So whichever method adopted by each institution will depend upon factors of location and productivity.

Realities cannot be overlooked while some workers in Tanzania enjoy free transport, then other workers who have no opportunity to enjoy this facility should be subsidised in their respective modes of travel by the employers.

Office transport therefore has minimal relationship with length of journey.

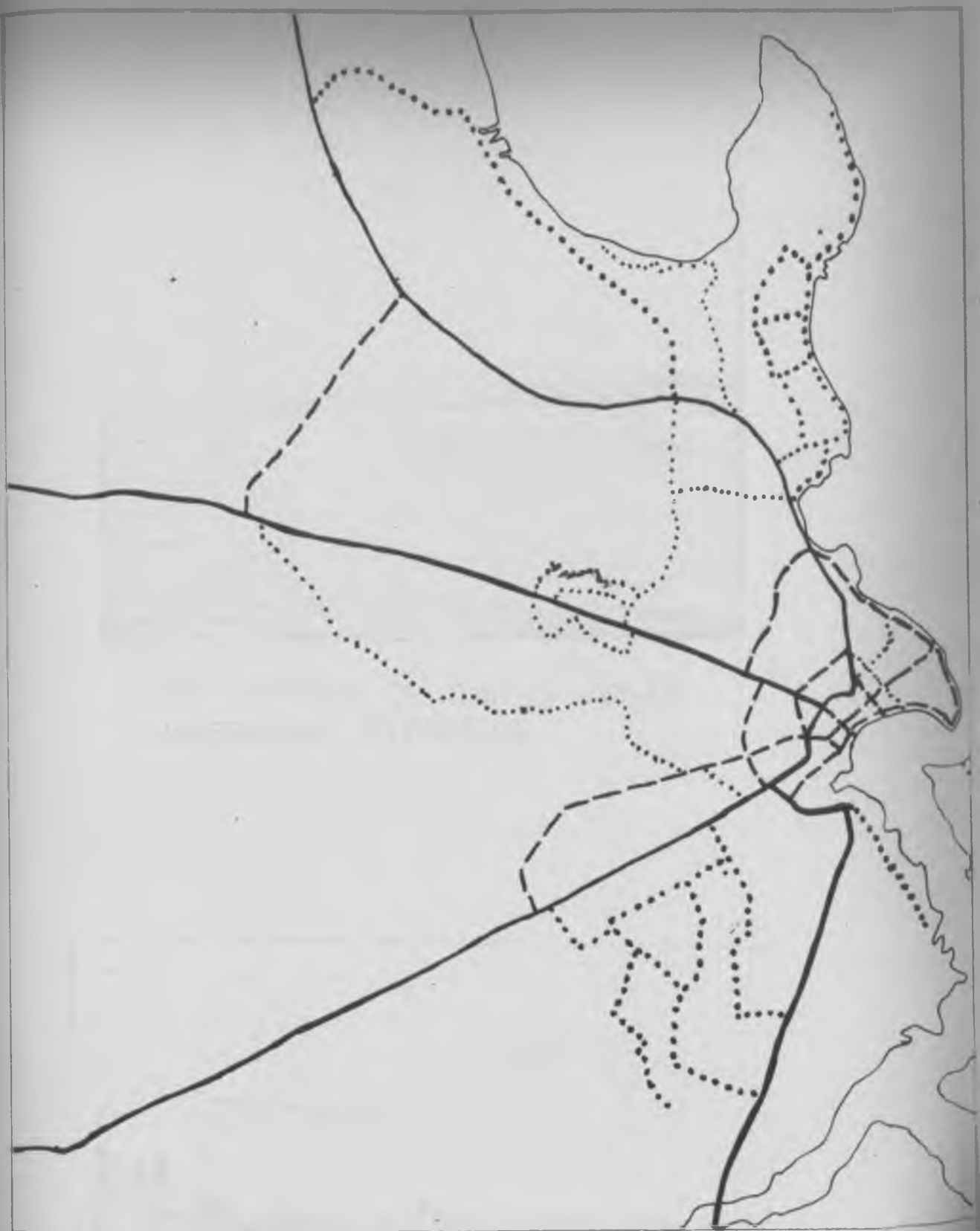
One very important aspect is the fact that office transport functions only during peak period and after that the vehicles stay idle throughout the day. Economically, of course, this is a misuse of funds since these buses could be made productive.

4.7 Others

These vehicles refered to here are trucks, vans, upcountry buses, rail transport. Most of these are not used by workers for their work journeys, but they have an effect of comparable magnitude to the modes used by workers.

These vehicles since they use the same roads as the journey to work travel modes, they increase the value of the Passenger Car Equivalent (p.c.e) on the road and thus contributes a lot to congestion at peak period. Transportation of these vehicles is not very much restricted like the motor cars. They are thus very numerous in Dar-es-Salaam.

There is no rail transport for workers in the city, however, various railway crossings which exist in the city are a major factor causing traffic jams on the following roads and locations:- Msimbazi Street, near the offices of Kamata, Nkurumah Street near D.T. Dobie junction, Kilwa Road near the Shell B.P. headquarters and Uhuru Street near the National Milling Corporation.

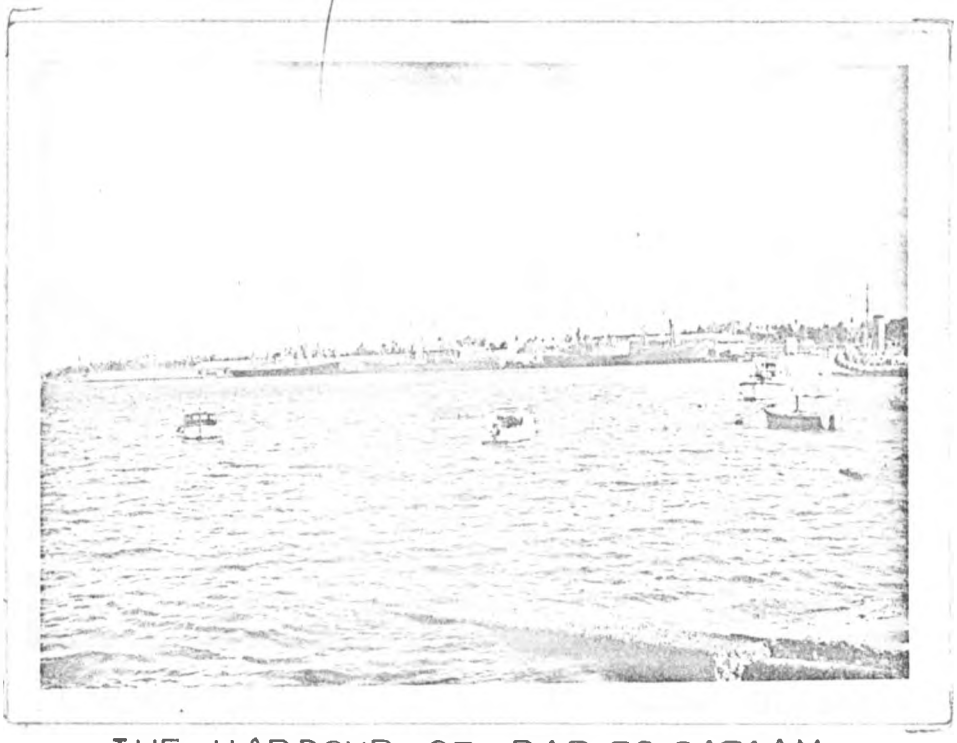


DAR ES SALAAM.
Major Road Network..

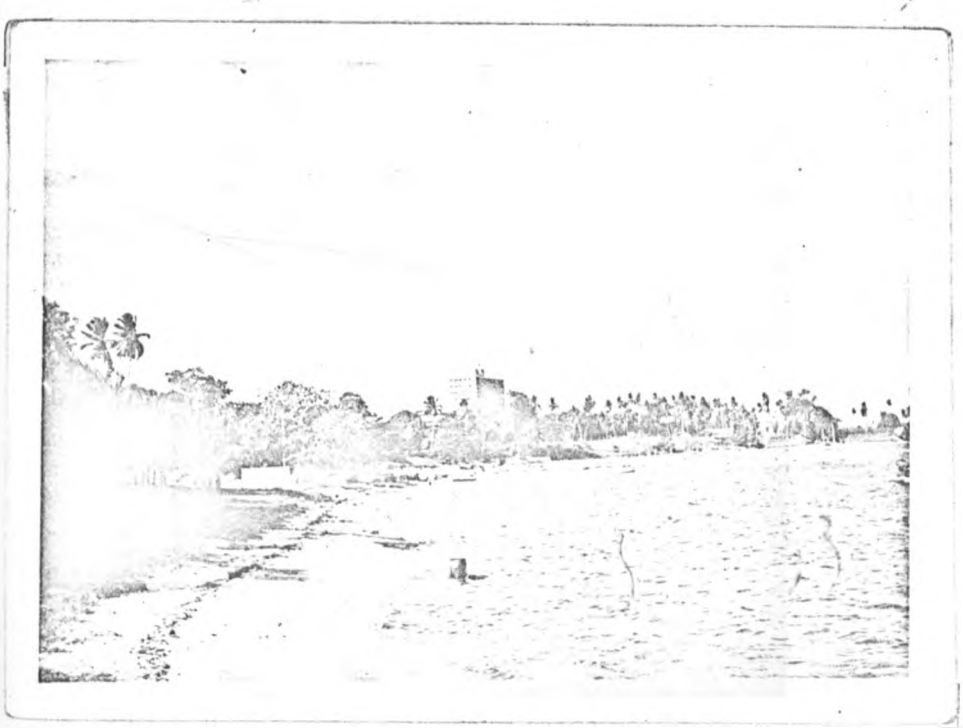
SCALE:
0 1 2 3 4

LEGEND.
——— Major Arterial Road
– – – Minor " "
·····Collector Road

A R Omari;
DEPT. OF URBAN & REG. PLANNING;
UNIVERSITY OF NAIROBI 1975/76

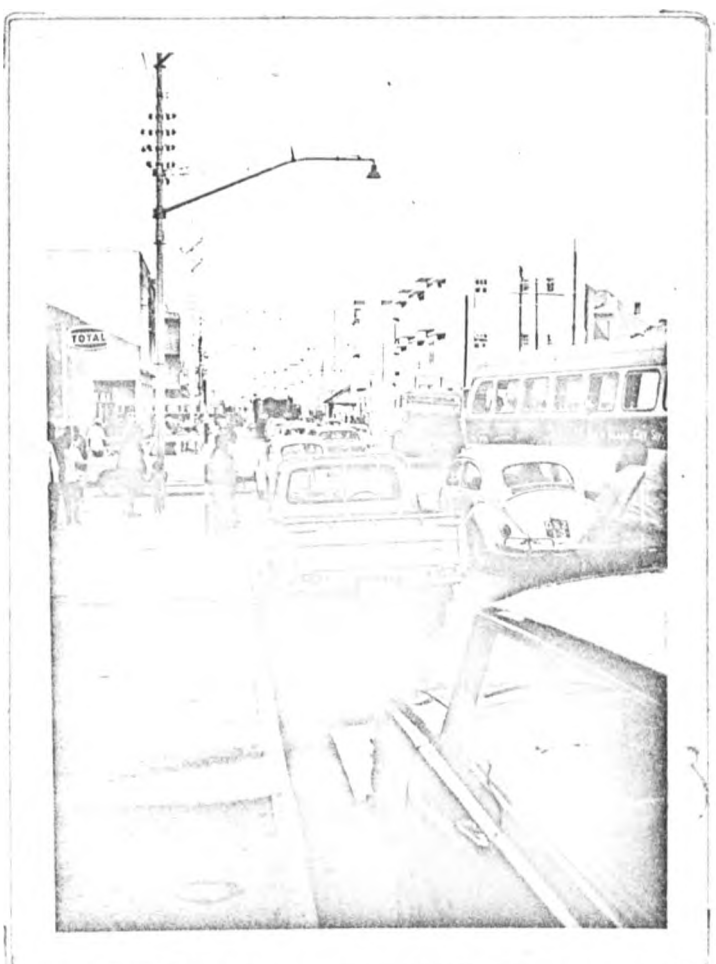


THE HARBOUR OF DAR ES SALAAM: UNDERGOING EXPANSION.



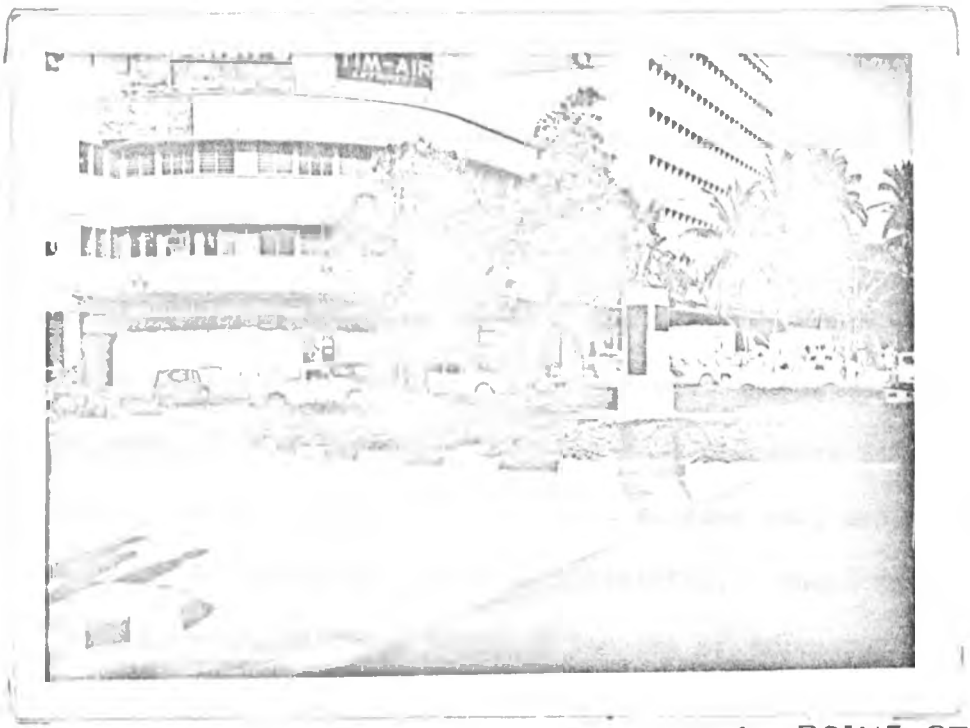
KIVUKONI FRONT: THE TOURIST ATTRACTION.

UHURU STREET: CYCLISTS HAVE NO RIGHT OF WAY.



UHURU STREET: UNABLE TO ACCO-MODATE PEAK PERIOD TRAFFIC.

PLATE 6.



ASKARI MANUMENT: THE CENTRAL POINT OF THE CITY.

CHAPTER V

FINDING AND PROBLEM IDENTIFICATION

5.1 Introduction

This study has tried to look at, why and how people decide to choose various modes of travel to work in Dar-es-Salaam. To understand this properly it has been necessary to examine the historical development in terms of land use, urban structure, population trends and economic activities. These factors were useful in establishing possible lengths of journeys, possible tidal flows of people at peak hour and people's abilities to afford various modes. Further, the examination of physical characteristics of the city helped to determine physical conditions which affect usage of various modes of travel.

The travel characteristics which were discussed under journey purpose, peak period traffic volumes, peak period travel demand and lengths of journey were useful in establishing traffic generation and distribution plus some factors which contribute to delays for various modes of travel to work.

The modes of travel to work has been examined one by one at length in terms of safety convenience, costs in terms of money and time, and space utilisation. This helped to determine the rationale of planning for each mode, and how facilities can be provided for each.

The existing road facilities of the city have been put in appendix number VI and VII.

After examining all the above aspects it has been noted that the overall general problem which affects transportation and development in not only Dar-es-Salaam but all urban areas in Tanzania is the general Government Policy when setting up priorities between rural and urban development. That is emphasis on rural development has tended to offset certain major urban projects. In fact the government allocates inadequate funds for urban developments as such things like drainage and road improvements are effected at a very slow pace.

In addition to the above problem some specific problems and findings were noted from specific aspects examined.

5.2 Length of Journey

(i) The majority of workers interviewed were found to stay within 10 kilometres. This implies that the journeys to work in Dar-es-Salaam are not excessively long. Thus the existing travelling problems at peak period are a result of not only the long journeys to work but also lack of suitable and efficient modes of travel to work. This implies that there is a need to have better and suitable modes of travel for better accessibility between activity centres and residential areas.

(ii) Housing allocation does not take into account the employment centres and how close they are to the residential quarters allocated to workers. This results into workers staying unnecessarily far away from their employment centres, when, with

proper housing allocation some workers in a particular employment centre can be made to stay at the closest residential area to that particular employment centre.

5.3 Travel Demand:

It has been noted that high density residential areas are mainly of low income thus efforts should be geared to solving the problems of travel, for workers staying in these areas. Therefore roads which connect high density residential areas with employment centres require proper traffic segregation facilities in order to achieve free flow of both persons and vehicles.

5.4 Choice of Mode:

Though it looks reasonable to assume that choice of mode is more related to length of journey than anything else, this study has clearly revealed that the choice of mode in Dar-es-Salaam is mainly related to income. This means in planning for various modes the income factor should be taken into account more than the length of journey. Of course, interelationship will somehow emerge since in reducing lengths of journeys to work the cost of using various modes is automatically reduced.

Problems associated with usage of each mode have also been noted and these are given below:-

5.4.1 Walking:

Since most of the new residential areas are continuously sprawling in the periphery then walking to work is not likely to be a suitable mode unless there is decentralisation of

employment centres. However walking is mainly a result of low incomes. So low income earners will continue to walk unless cheap modes of travel other than walking are improved.

Since the climate of Dar-es-Salaam is excessively hot and sometimes characterised by high rainfalls, walking becomes unsuitable for long distances. The maximum distance which a worker can travel comfortably to his place of work is about 3.0 kilometres in Dar-es-Salaam. But from this study it has been revealed that about half of these people (13% of all workers interviewed) who walk to their places of work were found to be travelling more than 3.0 kilometres. This means there is a need to divert these people to use other modes of travel.

3.4.2 Bicycles:

Though the study has disclosed that very few people use bicycles to travel to work, there are some points to support bicycle planning in Dar-es-Salaam. Firstly the area on which Dar-es-Salaam is located is relatively flat, as such it is an asset for cycling. Secondly about half of those workers who walk to their places of work were found to travel more than 3.0 kilometres which is considered as the maximum distance a worker can walk comfortably to work. These workers who amount to about 13% of all the people interviewed can be diverted to using bicycles, after all they are from the low income group. Thirdly the government issues loans to workers

to purchase bicycles. Fourthly there is a bicycle factory in Dar-es-Salaam which is expected to start operating at the end of 1976 by producing 150,000 bicycles a year. This is an asset not to be misused. Fifthly, about 12.5% of the workers interviewed indicated that they would use bicycles to work had it not been for the risks involved in riding bicycles on the narrow city streets. This implies that there are at least 12.5% potential cyclists. What is needed is provision of cycle tracks whenever possible. Sixthly the public bus transport has proved to be very inefficient to the majority of the workers. There is thus a possibility that some bus users might opt to use bicycles if there were proper cycle tracks.

In general, the bicycle facilities have been neglected in the city.

5.4.3 Public Bus Transport:

The study has revealed that the majority of workers use and will continue to use public transport even if it is operating inefficiently, as long as other modes of travel are not facilitated.

Though the number of buses owned by the Public Bus Transport (UDA) have increased year after year still these buses which were in operation were far less than the number of buses expected to operate. Also the revenue collected from the receipts do not seem to have increased with the increased

number of buses purchased. It did not even increase with increased number of passengers. The above two points reveal that there is poor management in the traffic, maintenance and finance departments. A need to train UDA workers.

The routing system of the public buses was found to be adequate except in the central area and Kariakoo where there is a need to filter buses into new roads in order to relieve congestion on Msimbazi and Uhuru Streets.

The required frequencies to meet the demand was found to be excessively high. On some roads like Morogoro and Pugu Roads the required frequencies cannot be achieved. Efforts to increase buses on such routes result into even further congestion. Buses along Morogoro Road, Pugu Road, Uhuru Street and Upanga Road are always full beyond capacities during the outward peak period trips. It therefore means that buying new buses cannot be a solution to the inefficiencies of the public bus company. Also it implies that there is a need to promote other modes of travel, improve the present road facilities particularly road widening, decentralise employment centres and construct new roads in order to divert traffic from the present congested roads.

Though most writers argue that fare is the biggest problem to bus users, this study has revealed that people in Dar-es-Salaam complain more of inconvenience and more time spent on the stop than the fare. So the fare structure cannot be considered to be all that bad.

For better management of buses and routes, buses are expected to operate to within 16 kilometres. In Dar-es-Salaam however, the UDA buses operate far beyond these distances and even up to 40 kilometres. This is very unrealistic particularly in cases of breakdowns. The majority of workers stay within 10 kilometres which implies that beyond that the buses move more or less empty at peak periods.

To conclude, it is evident that people who use public buses feel disatisfied with the services offered, and they opt to use buses because they have no alternative. In fact in future even the high income group people who

are expected to use cars will have to use public buses.

5.4.4 Private Car:

Because of economic constraints to both the people and the government car usage to work is very limited in Dar-es-Salaam not only to low income earners alone but also to high income earners. Car maintenance costs are extremely high and the majority of the present cars on the streets of Dar-es-Salaam are old and in poor conditions. In fact they are a major factor in air pollution in the city. Because of a situation like this few car owners do not use them for long distances to work. Some people staying between (0-3) kilometres were found to use cars to

travel to work. There is thus an element of prestige in using private cars.

Since at present the public bus transport is very inefficient the government should not discourage completely usage of private cars for work journeys.

5.4.3. Office Transport:

A group of workers enjoy free office transport, and this group is likely to increase in future. There is however no evidence that the government can afford free transport for all workers. That means there will always be elements of dissatisfaction among those workers who feel they have no chance of getting free transport.

Since the government has taken over responsibility of what people should earn, it has also to take an extra responsibility of all people's transportation to work more directly. This might mean offering subsidiaries to those people who have no chance of enjoying free transportation.

5.5 Road Facilities:

The present road facilities which connect major employment areas and the major residential areas are inadequate for all purposes.

(i) There is minimum traffic segregation for various modes of travel.

(ii) There is minimum traffic controls and those available require further improvements.

(iii) The majority of the major roads are not adequately wide and in most cases the present traffic has already exceeded the design capacity of the lanes.

(iv) Widening of some roads is impossible because of the built up areas along them, however, traffic controls like one way street system and parking prohibitions are possible.

(v) The considerable congestion which exists on the urban roads in spite of a few number of cars existing is a result of;[30]

a. Inadequate traffic control devices
b. Haphazard parking along main road
c. Lack of stop bays (lay bays)
d. Increasing numbers of vehicles on the same road space.

(vi) There are no cycle tracks at all but there are few pedestrian paths.

(vii) Surfacing and drainage of the roads are generally poor and floods are very frequent during the rainy seasons.

(viii) Roads in the central area require complete re-organization in order to facilitate traffic segregation and thus reduce congestion.

(ix) Pugu Road which is about to be completed[31] and which will be a continuation of the second phase of Uhuru wa Wanawake

---

30. NTC (National Transport Corporation) paper on causes of Traffic Congestion in Dar-es-Salaam - 1974.

31. This road is under construction by the Moulen Company. Construction will be completed in 1976.

Street has almost all the required road facilities on a major road. It has almost all the required aspects for traffic segregation. However there are short comings from this design:-

a. The provided facilities do not seem to match with facilities on other roads in the city centre. For example a cyclist from Pugu Road on reaching the round-about at D.T. Dobie will have nowhere to go because there are no cycle tracks from there up to the city centre. And it is not possible to have these because of the built up areas.

b. The section west of Chang'ombe road will not be as useful as planned for, because it does not head to any highly densely populated residential area as such the pedestrian paths and cycle tracks which have been constructed will not have much purpose. The pedestrian paths and cycle tracks on this section would have been useful along Chang'ombe Road because this road heads towards densely populated residential areas of Chang'ombe, Temeke, Keko and Tandika.

CHAPTER VI

POLICY PROPOSALS

6.1 Introduction

The previous Chapter discussed the main problems identified in the study and set out some guiding principles for formulating future policies for transportation in Dar-es-Salaam.

This chapter attempts to formulate alternative policy proposals to connect the problems identified on the basis of the guidelines thus set out in the previous chapter.

The overall transportation pattern will be geared to minimising travel costs with suitable modes. This will be achieved by minimising lengths of journey to work by adopting proper policy in housing allocation to workers. Employment decentralisation will also contribute to minimising travel costs.

For various modes of travel to work there should be adequate coordination at interchanges and in the general policy for each mode.

There will be attempts to minimise the present level of congestion in the city so as to have free flow of traffic for various modes of travel.

Road improvement will mainly take place on only major roads which connect employment centres and major high density residential areas.

6.2 Government Policy

It is recommended to form a body which will advise the government on the importance of urban development (See implementation section 6.10).

6.3 Measures to Reduce Lengths of Journey to Work

Since in Tanzania private housing market is very scarce and the chief suppliers of habitable houses are the National Housing Corporation and the Registrar of Buildings, which are government affiliated bodies, then it is rather easy to try and allocate houses to people, which are closest to their employment centres.

Thus it is recommended that in allocating houses to workers in the central area, the workers should receive priority to stay in the residential areas of Kariakoo, CBD, Upanga, Kimondoni, Ilala, Magomeni, Kagamboni, Oyster Bay, Msasani, Regent Estate, Kijito Nyama, Kurasini, Chang'ombe and Buguruni.

All workers around Ubungo should be given priority to stay at Ubungo, Kimara, Manzese, Sinza, Mabibo, Mburahati, Kijito Nyama, Mwananyamala, Magomeni, Kigogo, and Tabata.

Workers at Fuga Road/Chang'ombe Industrial area should receive priority to stay at Chang'ombe, Keko, Temeke, Tandika, Mipava, Ukonga, Mbagala, Mtoni, Kurasini, Vingunguti, Tabata, Kariakoo, Ilala and Buguruni.

In order to decentralise employment it is recommended to expand the employment capacities of the following areas:-

(i) Kariakoo for government offices

(ii) Ubungu for Industries

(iii) Kurasini and Mgulani for government offices and industries

(iv) Mikocheni for light industries

(v) Kigamboni for heavy industries. This should be accompanied by construction of the causeway at Kurasini creek. Map No. 18 shows the areas mentioned.

Table No. 36 shows number of employees per zone up to 1990.

TABLE NO. 36 - EMPLOYMENT AREAS - 1990

AREA	ESTIMATED NO. OF WORKERS ACCOMMODATED
Central Area) Kariakoo)	100,000
Ubungo Industrial Area	30,000
Kurasini/Mgulani	10,000
Mikocheni	5,000
Kigamboni	20,000
Pugu Industrial Area	30,000
TOTAL	195,000

6.4. Pedestrians

Since pedestrian movements have been limited to about 3 kilometres then these movements have planning significance mainly in the CBD, as such apart from recommending some verges and footways on some major roads the author has found it difficult to put any recommendation concerning pedestrian movements at peak period in the CBD because it was beyond his capacity as time did not allow for such a comprehensive study to be taken.

6.5 Bicycle Planning

It is recommended to have cycle tracks on all roads permiting high density residential areas from employment centres. The distances covered for bicycle planning should be around 7 kilometres from a residential area to an employment centre.

In some cases independent cycle tracks will be planned and in other cases cycle lanes along major roads will be considered.

Only main cycle tracks or lanes will be planned so that the cyclists will be expected to penetrate to their employment areas from the main cycle ways.

Parking areas for bicycles near offices and on the three bus terminals of Kariakoo, General Post Office and near the railway station, should be prepared to ensure safety and security.

All roads on which there will be cycle lanes should be free of any parking and have minimum bus stops, if they happen to be bus routes.

Areas of severe traffic congestion should be avoided for cycle planning except in places where it is possible to expand the road. The central area is thus not suitable for bicycle planning. This being the case it is recommended to have mode interchange at the three bus terminals. To achieve this the author recommends to have bicycle parking sheds at the three bus terminals so that there is adequate security and safety for the bicycles. So the cyclists from the residential areas of the city centre will have to pass through the terminals and leave their bicycles there

since cycling in the central area is completely hazardous. The cyclists then will be required to take buses which can circulate them in the city centre. Charge for bicycle parking will be =/20 and the charge for boarding the bus will be =/50. This makes a total of =/70.

The cycle tracks should be between 1.8 metres to 3.7 metres wide depending on the availability of land and rate of flow of the cycle traffic expected. The cycle lanes should be between 1.8 metres to 2.7 metres.

As it has been identified that there are about 12.3% potential cyclists for work journeys by 1976, then about 13,200 employees will need bicycles in 1976. Assuming the percentage unchanged up to 1990, the factory should be able to supply between 13,200 to 24,000 bicycles for Dar-es-Salaam alone up to 1990.

DAR ES SALAAM.
Proposed central area public bus routes.

SCALE:
0 1·5 3 Km

Legend:

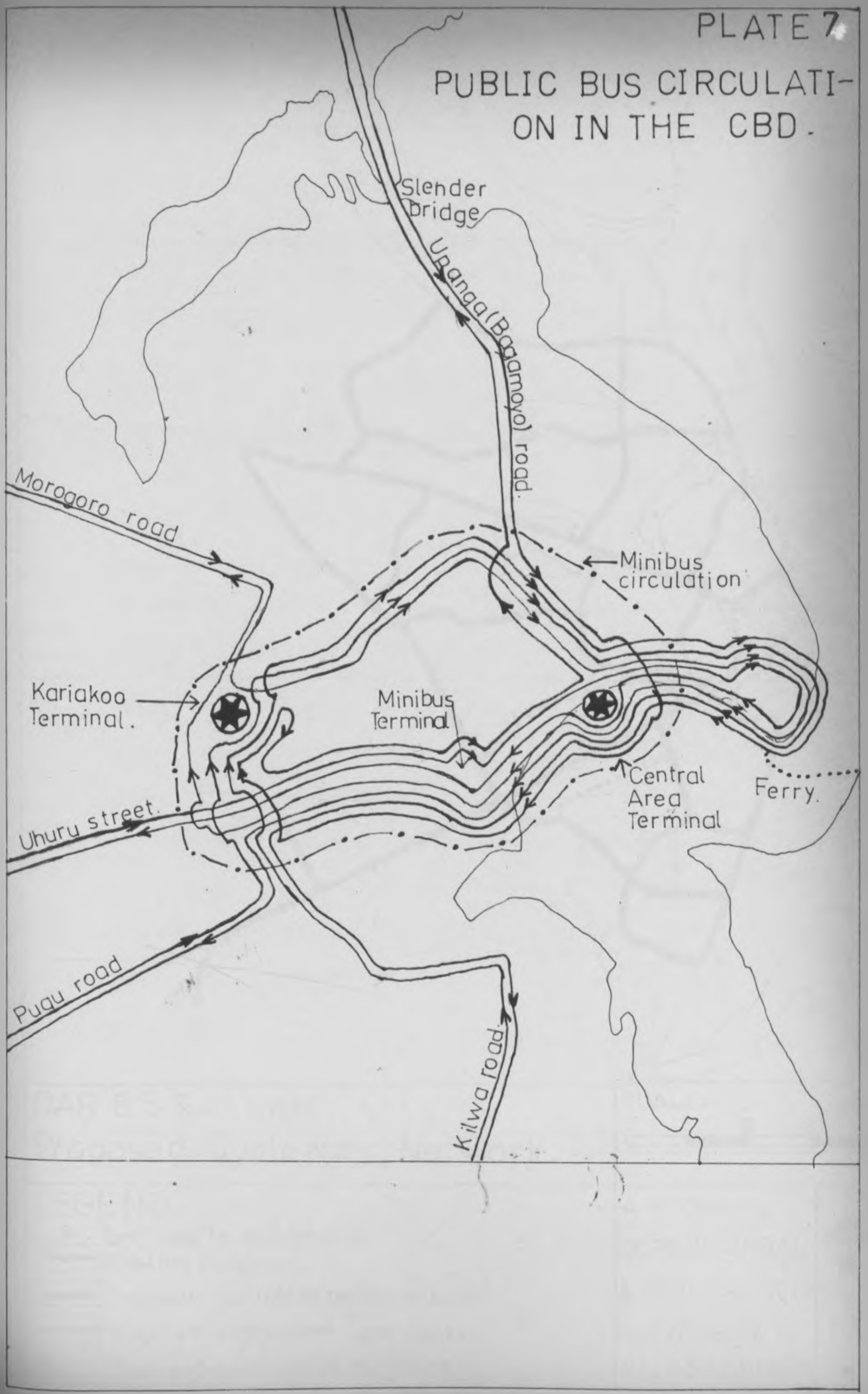
★ Bus terminal.
○ ,, stop

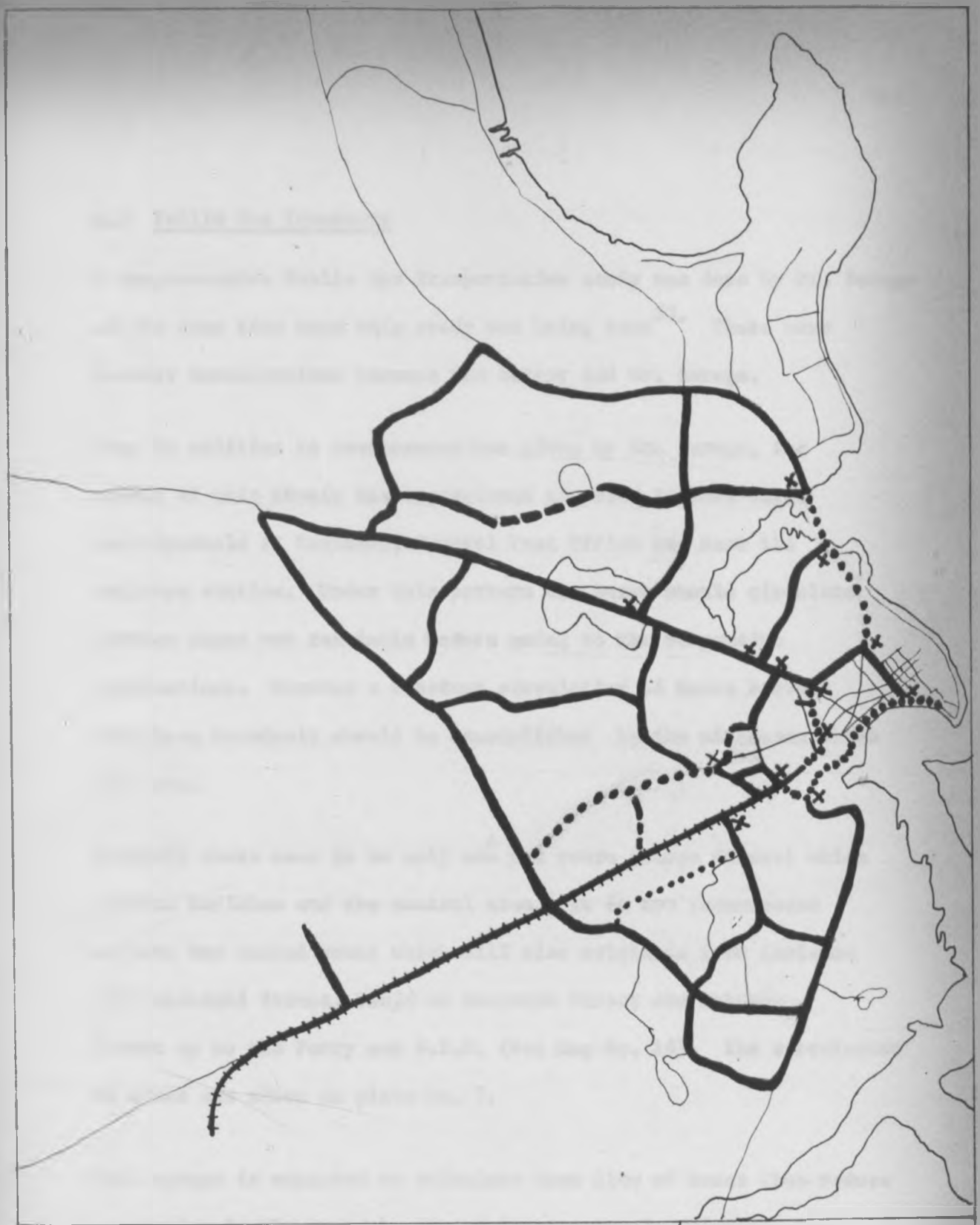
A.R. Omari
DEPT. OF URBAN & REG, PLANNING, UNIVERSITY OF NAIROBI.
1975/76.

16.

PLATE 7

PUBLIC BUS CIRCULATION IN THE CBD.





DAR ES SALAAM.
Proposed Cycleway Network.

SCALE: Km.
0 1 2 3 4

LEGEND.

- Junctions to be signaled.
- Existing Cycleways.
- Proposed Cycle tracks parallel to roads.
- Proposed independent Cycle tracks.
- Proposed Cycle lanes on Roads.

A R Omari;
DEPT. OF URBAN & REG. PLANNING
UNIVERSITY OF NAIROBI. 1975/76

17

6.6 Public Bus Transport

A comprehensive Public Bus Tranportation study was done by Mr. Berege at the same time when this study was being done[32]. There were however consultations between the auther and Mr. Berege.

Thus in addition to recommendations given by Mr. Berege, the author of this thesis has appreciated the need to have three bus terminals at Kariakoo, General Post Office and near the railways station. Under this pattern the buses should circulate between these two terminals before going to the respective destinations. However a constant circulation of buses between the three terminals should be accomplished by the minibuses which UDA have.

Formerly there used to be only one bus route (Uhuru Street) which connect Kariakoo and the central area. It is now recommended to have the second route which will also originate from Kariakoo via Mahikichi Street, Umoja wa Wanawake Street and Mabtabu Street up to the Ferry and G.P.O. (See Map No. 16). The circulation of buses are shown on plate No. 7.

This system is expected to stimulate free flow of buses thus reduce congestion in the central area, and consequently stimulate the frequencies. The present congestion in Msimbazi Street and Uhuru Street will be very much minimised.

---

32. See Promotion of Efficient and Effective Urban Public Transportation system in Dar-es-Salaam - The Case of UDA by Mr. Berege.
To be published by the Department of Urban and Regional Planning University of Nairobi, 1976.

It is further recommended that all bus routes in the central area must have bus bays on bus stops. Whenever this cannot be achieved then such bus stops should be eliminated in the CBD.

In order to alert the conductors on the question of time there should be the maximum time allowed for a bus to stay on the bus bays while it is on a particular route.

In the other parts of the city the present routing system should not be disturbed except in cases where a new route has to be introduced because of sprawled residential areas.

Though Mr. Berege has recommended that there should be flat fare of Sh. 1/-, the fare from Kariakoo to central area should remain -/50 so that it will not be expensive for cyclists.

6.7 Office Transport

In view of the fact that vehicles used as office transport only function at peak period and stay idle throughout the day, it is recommended to have these buses incorporated into Public Bus services on hire basis. This means the buses should be owned by the respective employers but can be hired by the Public Bus Transport Organization (UDA) any time they find it necessary. The drivers of the buses should remain employed by the employers who own the buses. Only the conductor should belong to UDA. Maintenance of the buses should be the responsibility of the owners.

To achieve this co-ordination properly requires staggering of office hours. Since staggering of working hours in Dar-es-Salaam seem to be very adequate (See the Introduction) it is suggested that offices which function between 8.00 a.m. up to 3.00 p.m. and have buses should allow their buses to help workers whose offices open between 7.30 a.m. to 2.30 p.m. In this way it is possible for all buses used as office transport to make at least one or two express trips for the public bus tranport before going to serve their respective offices.

6.8 Private Car and Moto Cycle

The above modes of travel to work seem to be discouraged by the government since they involve government expenditure in foreign reserve.

Since usage of these modes is still useful for not only work journeys but also for other journeys it is recommended that the government should encourage importation of motorcycles and cheap cars. Cheap cars in this case refers to small cars like volkswagen, roho and mini morris. These cars are cheap and small but they serve more or less the same purpose as big and expensive cars which the government still import for senior government officers.

Through proper planning the government can start a car assembly plant for small cars only. This has an advantage of car owners being assured of spare parts.

6.9 Road Improvements

Morogoro road should be widened to four lanes with cycle tracks and Pedestrian footpaths between the junction of United Nations Road and Mansese. Under this design it will handle the traffic of about 4800 p.c.u. per hour. From the projections this road is supposed to handle 10,100 p.c.u. per hour by 1990. This explains why traffic has to be diverted from this road in order that theexcess 5,300 p.c.u. per hour can be accommodated in other roads. The proposed post access road which will have four lanes cycle tracks and pedestrian footways; and the recommended improvement to a road connecting Magomeni and Kigogo road to two lanes with cycle tracks should be able to release Morogoro road substantially.

Pugu Road will handle the traffic by 1985 since the present design of that road allows about 4,800 p.c.u. per hour which is far more than the traffic it is handling now (3,240 p.c.u.).

Bagamoyo Road between Tanganyika motors and the junction of Kinondoni Road, should be widened to four lanes with cycle lanes and verges. This means slender bridge will have to be rebuilt. The other section of Bagamoyo Road up to Mikocheni should have cyle tracks added.

Uhuru Street should be widened to four lanes with verges from Buguruni up to Msimbazi round-about. Cycle lanes should be included from Buguruni up to Karume Stadium. The other section of Uhuru Street will have traffic reduced by diverting the public buses (See Map No. 16).

Mombasi Street is now already four lanes and the only improvement to it is to reduce the number of buses passing through the section between Mombasi round about and Kariakoo Police Station.

Kilwa Road should be widened to four lanes at the section between Bandarini road round about up to the offices of East African Harbours Corporation. Cycle tracks and verges to be included to the other section of Kilwa road should have cycle tracks included only.

Chang'ombe road should have cycle tracks and foot paths included. It will remain with its two lanes.

The rest of the roads require to be with two lanes, cycle tracks and pedestrian paths or verges. These roads are:-

(i) Kigogo Road

(ii) Temeke Road

(iii) Morocco Road

(iv) United Nations Road

(v) Kinondoni Road

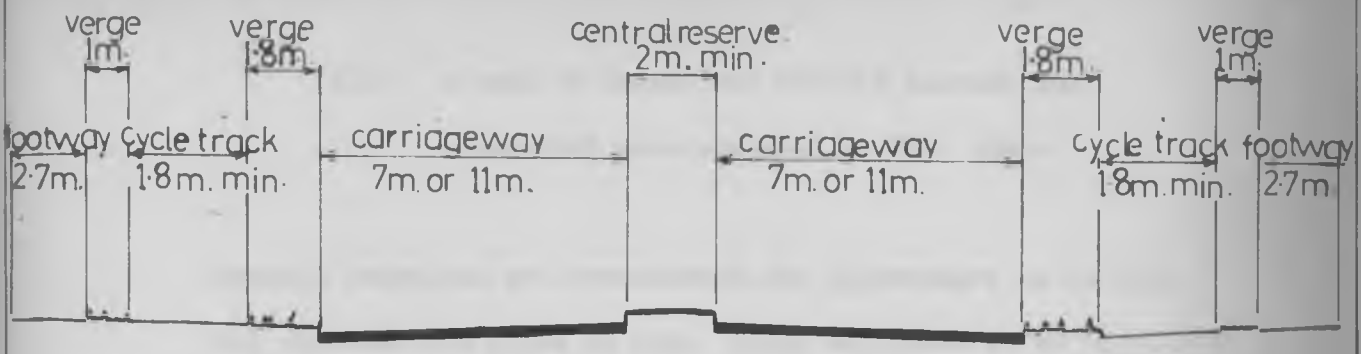
(vi) A road from Kijito Nyama to Sinza and Ubungo

Some roads proposed to have cycle lanes are:-

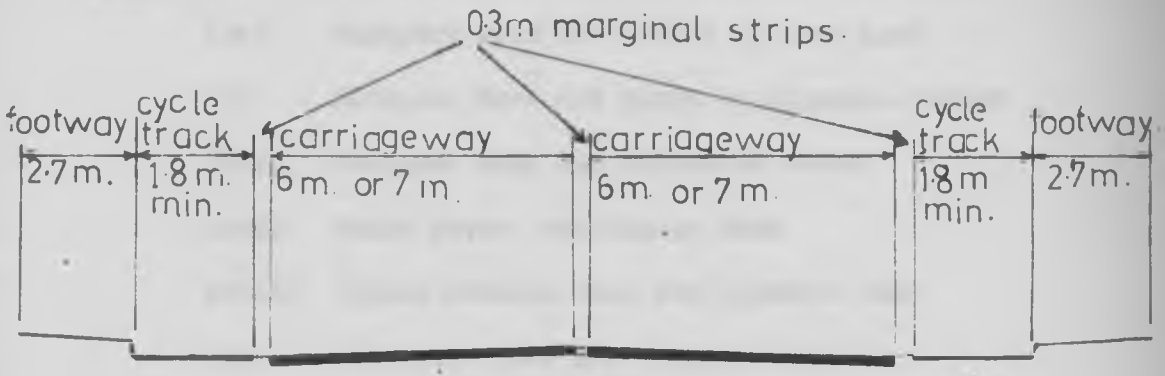
(i) City Drive

(ii) Umoja wa Wanawake Street between Morogoro Road junction up to Libya Street and Nkurumah Street.

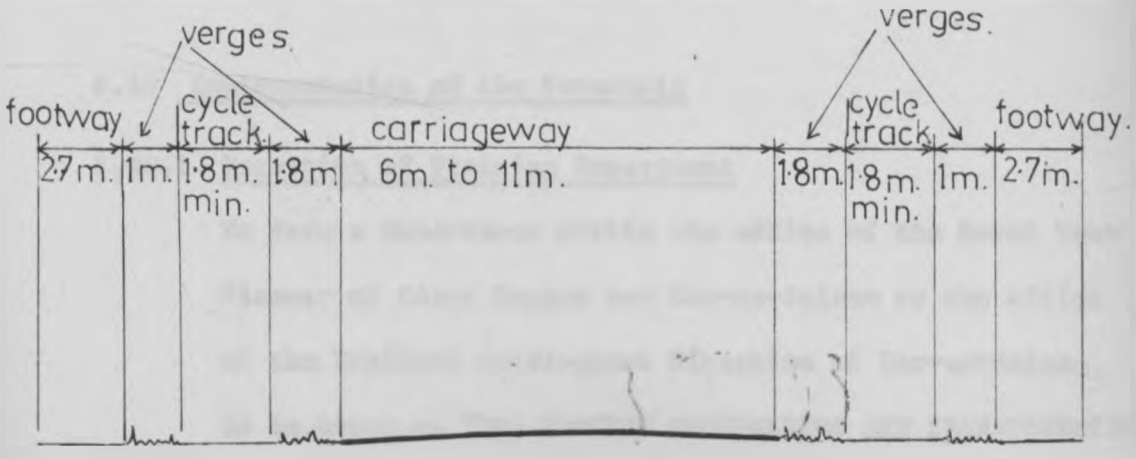
CROSSECTION OF ROADS PLATE 8.



Pugu Road.
Morogoro Road.
Port access Road.



Uhuru street. between Buguruni and Karume stadium.
Bagamoyo Rd. ,, Kinondoni Rd. & Tanganyika motors.
Kilwa Rd. between Harbours' offices & Gerezani Rd. roundabout.



Other recommended roads.

(iii) A road to Temeke and Tandika through the industrial area parallel to Pugu Road.

Certain junctions are recommended for improvement as to give the cyclists the right of way. These will have to be signalled.

(i) Msimbazi Street and Pugu Road

(ii) Pugu Road and Chang'ombe Road

(iii) Uhuru Street and Umoja wa Wanawake Street.

(iv) Morogoro Road and United Nations Road

(v) Morogoro Road and Umoja wa Wanawake Street

(vi) Morogoro Road and Msimbazi Street

(vii) Uhuru Street and Kigogo Road

(viii) United Nations Road and Bagamoyo Road

(ix) Kimondoni Road and Bagamoyo Road

Cross sections of the proposed improvements on roads are shown on Plate No. 8.

6.10 Implementation of the Proposals

6.10.1 Formation of Planning Department

To form a department within the office of the Zonal Town Planner of Coast Region and Dar-es-Salaam or the office of the Regional Development Direction of Dar-es-Salaam, to be known as "The TRAFFIC ENGINEERING AND TRANSPORTATION PLANNING DEPARTMENT". This department will deal directly with the traffic and transportation problems and appraise all projects in relation to this.

In order that this department should function properly, it is recommended to form an advisory committee to it. This committee should be comprised of the following officers from various departments or ministries, and should be known as "THE DAR-ES-SALAAM TRAFFIC AND TRANSPORTATION ADVISERY COMMITTEE".

Membership in this committee should include:

(i) Head of the Traffic Engineering and Transportation Planning Department from the Regional office.

(ii) The Senior Police Traffic Officer.

(iii) The Traffic Manager of UDA.

(iv) Representative from the National Transport Corporation.

(v) Representative from the Ministry of Manpower Planning and Development.

(vi) Representative from the Ministry of Works.

(vii) Representative from the Ministry of Lands, Housing and Urban Development.

(viii) Representative from the Ministry of Communications and Transport.

(ix) Representative from the National Housing Corporation.

(x) Representative from the Registrar of Buildings.

(xi) Representative from the State Motor Corporation.

This committee is expected to meet once a month and discuss the progress and then recommend further action to the Traffic and Transportation Planning Department on issues

concerning tatransportation facilities for workers.

6.10.2 Considered For Immediate Implementation:

(i) Formation of the Traffic Engineering and Transportation department and its advisory committee.

(ii) Construction and improvement of the two bus terminals plus the new route connecting the Kariakoo terminal with the General Post office (G.P.O.) terminal. This will help to relieave

traffic congestion in Uhuru Street and Msimbazi Road.

(iii) Construction of Morogoro Road with four lanes, cycle tracks and pedestrian paths.

(iv) Construction of Port Access Road.

(v) Widening Uhuru Street.

(vi) Construction of Slender Bridge and widening Bagamoyo Road at the section between Tanganyika Motors and Kinondoni Road.

(vii) Improving the road between Magomeni and Kigogo Road.

(viii) Chang'ombe Road widening.

(ix) Inclusion of cycle tracks and lanes on Ohio Street, City Drive and Nkuruma, Libya and Umonja wa Wanawake Street.

(x) Co-ordination between office transport and the Public bus transport.

(xi) Improvement of the following round about :

Maimbini Street and Pugu Road

Uhuru Street and Umoja wa Wanawake Street

Morogoro Road and United Nations Road

United Nations Road and Nyerere Road

Kinondoni Road and Nyerere Road.

6.10.3 Costs

The costs which have been considered by the author are those of priorities; and mainly are for road improvements.

By Tanzania standards the cost of one metre of road with various facilities is as shown below:-

One metre road - four lanes
cycle tracks
Pedestrian footpath
Central reserve
and other infrastructure - Sh. 8,636/40 [33]

One metre road - four lanes
cycle lanes
verges
and other infrastructure - Shs. 6,000/- [34]

---

33. Information from Howlem Company - Dar-es-Salaam 1976 - The Company constructing a 12 kilometre section of Pugu Road at a cost of about 100,000,000/-.

34. Author's estimates.

One metre road - two lanes

cycle tracks

pedestrian paths

and other infrastructure - Sh. 5,000/- [35]

Also cost of installing traffic lights on a round about is above Sh. 30,000/-.

Thus the cost for priorities are shown below:

Morogoro Road - 4 lanes, cycle tracks and pedestrian footpaths

- 5 kilometres - 43,182,000/-

Cost for the bridge 5,000,000/- [36]

Total 48,182,000/-

Port Access Road - 4 lanes, cycle tracks and pedestrian footpaths - 5½ km. 45,316,100/-

Cost for the bridge 5,000,000/-

Total 50,316,000/-

Uhuru Street widening - 4 lanes, cycle lanes and verges

3½ kilometres 22,500,000/-

A road connecting Magomeni to Kigogo Road

- 2 lanes, cycle tracks and pedestrian footpaths - 3 kilometres 15,000,000

---

35. Information from The One year development plan for Dar-es-Salaam 1975/76.

36. Information from the One Year Development Plan for Dar-es-Salaam 1975/76

Construction of Slender Bridge and widening Bagamoyo Road at the section between Tanganyika Motors and Kinondoni road - 4 lanes, cycle lanes and verges, - 2½ kilometres.

Cost of the bridge	10,000,000/-
Cost of the Road	15,000,000/-
Total	25,000,000/-

[37]

Chang'ombe Road widening - 2 lanes, cycle tracks and pedestrian footpaths - 1½ kilometres - 7,500,000/-

Construction of Kariakoo bus terminal plus bicycles parking sheds on all the three terminals - 3,000,000/-

Improvement of round abouts :

- Msimbisi Street and Pugu Road - costs have been included in the costs for the construction of Pugu Road.

- Pugu Road and Chang'ombe road - costs included in the costs for the construction of Pugu Road.

- Uhuru Street and Umoja wa Wanawake Street - 50,000/-

- Morogoro Road and United Nations Road - 150,000/-

---

37. Ibid.

- United Nations Road and Bagamoyo Road

50,000/-

- Kimondoni Road and Bagamoyo Road

50,000/-

TOTAL COSTING OF THE PRIORITIES 171,798,000/-

In the one year development plan for Dar-es-Salaam region 1973/74 about 48,649,000/- was estimated to be used for transportation facilities. Assuming that the same amount or more will be allowed for the same purpose for the region in subsequent years, then it is possible to accomplish the priorities within three years.

CHAPTER VII

SUMMARY AND CONCLUSIONS

7.1. Summary

This thesis deals with the Peak period urban transportation problems. The study has however been very much geared to looking at relationship between length of journey and choice of mode of travel to work in the city of Dar-es-Salaam.

The analysis is started with the statement of the problem, significance of the problem, purpose of the study, scope assumptions, Government policy, review of previous studies, methodology and limitations of the study. From this followed the background analysis for the city of Dar-es-Salaam. Here physical characteristics, urban structure, land use and historical development of the city were discussed. Description of the population distribution, density, and projections plus the spatial income distribution has helped to show which areas of the city are suitable for what modes of travel to work.

The travel characteristic in the city has been examined under the headings of journey purpose, peak period traffic volumes, peak period travel demand and length of journey. These factors are useful in understanding traffic generation and distribution plus some factors which contribute to delays for various modes of travel to work.

The modes of travel to work has been examined at length in, terms of safety convenience, costs in terms of money and time, and

and space utilisation. This helped to determine the rationale of planning for each mode, and how facilities can be provided for each mode of travel.

From the findings and problems identified recommendations have been given concerning:-

(i) Road facilities (taking into account of all modes of travel to work).

(ii) Policy improvement for various modes of travel to work and cordination between them. Much emphasis has been given to bicycle planning because of its potentially economical characteristics. Recommendations concerning public bus transport has been very limited because

a study of this mode was specially done at the same time when the author was doing this study (See Mr. Degera's thesis on "Promotion of an Effective and Efficient Public Transport in Dar-es-Salaam"- The Case of UDA).

(iii) Some changes on the land use in order to shorten lengths of journey to work.

(iv) Some policy change on housing allocations to workers.

(v) Some policy change on administrative structure for Dar-es-Salaam region.

7.2 Conclusion

It is very theoretical to believe that the choice of mode of travel to work in Dar-es-Salaam depends on the lengths of journey to work since this study has revealed that choice of mode is more characterised by the income factor than the lengths of journey to work.

Though most lengths of journeys to work in many cities of developing countries are within 13 kilometres, in Dar-es-Salaam it has been revealed that the majority of workers stay within 9 kilometres which help to explain that the problems of travel to work which the people of Dar-es-Salaam experience are a result of poor accessibility, lack of facilities for various modes of travel and poor management of these modes of travel to work, and also poor management of traffic.

This study has further revealed that a certain number of people who walk to their places of work do not seem to favour it; a substantial percentage of workers in Dar-es-Salaam are willing to use bicycles except that they fear dangers of accidents in the city; the mostly used mode of travel to work is the public bus transport. However it is one of the most inconvenient modes to people so that people use public bus transport simply because no other modes of travel are readily available. The study has further revealed that because private car ownership is very limited even to people with high incomes then its usage is confined to those who happen to own them. As a result they are used even for very short distances. Long distances to work are avoided by car owners because of the expensive running costs.

The author feels with proper planning and cordination with all departments and ministries which contribute to transportation and traffic planning it is possible to alleviate the problem

of travel to work in Dar-es-Salaam. A successful step in this respect should be to give complete national policies rather than patial ones. For example in order to promote bicycle usage the government has installed a bicycle factory in Dar-es-Salaam plus issuing of loans to workers to purchase bicycles. But since there has been no efforts to provide cycle tracks or lanes on the city streets, people do not seem to be willing to use bicycles. Thus government efforts do not seem to have been fruitful in this respect at all.

7.3 Areas of further research-

In the analysis and recommendations the author has not tackled the problems of pedestrian movement in the central area of Dar-es-Salaam. This is the area where future researches can be carried out in order to determine the various movements of people from one area to another in the CBD so as to determine the requirement of central area pedestrian facilitiels, which are presently inadequate in the CBD.

Another area of further research is the CBD vehicular traffic. The city which is characterised by narrow streets in the CBD experiences traffic congestion not only at peak period but almost during all working hours. Thus there is a need to understand how traffic segregation measures can be effected.

Private car ownership in Dar-es-Salaam can be researched on further in order to determine the effects of increased and decreased rates of car ownership. Factors of guidance in this respect are that increased car ownership results into:-

(i) Increased mobility more for non work trips than work trips.

(ii) Increased accidents and deaths.

(iii) Increased polution and noise.

(iv) Increased congestion.

(v) Most people to use their private cars in preference to public transport.

(vi) Fighting for home dwellers to the suburbs.

(vii) Movements of industries to sites adjacent to good road facilities.

(viii) A decrease in foreign reserve of a country.

The result from this study can determine the rationale of car importation.

B I B L I O G R A P H Y

1. Dar-es-Salaam Master Plan

By Project Planning Associates - Toronto - 1967

2. Journey to Work - Modal Split

By F.R. Wilson.

3. Motorways in the Urban Environment

By Llewelyn-Davies, Weeks, Forestier-Walker and Bor.

A British Road Federation Report London - 1971

4. Town Planning and Road Traffic

By Alker Tripp

Edward Arnold & Co - London 1951

5. Road Traffic and Its Control

By Alker Tripp -

Edward Arnold & Co - London 1950

6. Study on City Transportation in Dar-es-Salaam

By Gesellschaft fur Verkehrsberatung und

Verfahrenstechniken MBH - Hamburg - 1971

7. A Study on Bus Transportation for Site and Service Areas of Dar-es-Salaam

By Cowiconsult - 1973

8. A report on Public Transportation System of the City Dar-es-Salaam

By a team of Hungarian experts sponsored by TESCO - September 1974.

9. The NTC (National Transport Corporation) paper on the Causes of Traffic Jams During Peak periods and recommendations of short and long term solutions - A case of Dar-es-Salaam City. January 1974.

10. A critical Approach to Project Appraisal

A case study of Transportation in Dar-es-Salaam City by Njendela, K. Mapunda and Jaka M. Mwambi.
Department of Economics - University of Dar-es-Salaam - 1975

11. National Institute of Productivity's Report on UDA

Organisation of the Traffic and Engineering Departments

By P.N. Mukurasi - October 1974.

12. Mpango Wa Maendeleo wa Mkoa wa Dar-es-Salaam

1975 - 76 (1 Year Development Plan for Dar-es-Salaam)

By the Prime Ministers Office.

13. Five Year Development Plan for Dar-es-Salaam - 1975-1979

By Prime Ministers Office

14. Kariakoo

By the Ministry of Lands Housing and Urban Development - August 1975.

15. Dodoma Master Plan

Transportation Studies - Technical Supplement No. 3

(Vol. I and 2)

16. Roads in Urban Areas

By Ministry of Transport

Scottish Development Department

The Welsh Office

Her Majesty's Stationery Office - 1966

17. Urban Transportation

Sector Policy Paper

By World Bank - 1975

18. The New Scientist (Manual) of 9 January, 1975

How Delhi made the buses run on time

By Jon Tinker.

19. The Planner - Journal of the Royal Town Planning Institute Volume 60 - March, 1974

Cycleways in Greater Peter Borough.

20. The Planner - Journal of the Royal Town Planning Institute Volume 61 - June, 1975

Bicycle Planning in London - By Peter Trevelyan

Planning for Pedestrians - By Ronald Widdenhoeft.

21. Report No. 11A and 11B

Planning Team

Town Planning Department

Ministry of Works and Supplies

- An Appraisal of Movement - June, 1973.

22. Nairobi Urban Study - 1970

23. Traffic Engineering Practice

Edited by E. Davies

E & F.N. Spon Ltdd. - London 1966.

24. Traffic in Towns

The specially shortened edition of the Buchman Report -

a penguin special.

- Published by H.M. Stationery Office 1963 - Great Britain

By Hazells offset Ltd. Slough, Bucks and Hazell Watson &

Viney Ltd. Aylesburg, Bucks.

25. The Land Use/Transport System

Analysis & Synthesis

M.R. Blunder

Pergamon Press Oxford

26. New Perspective In Urban Transportation Research

By A.J. Calanese

Lexington Books

D.C. Heath & COmpany - London - 1972.

27. Traffic Planning & Engineering

F.D. Hobbs

Pergamon Press - Oxford - 1974

28. Transportation and Urban Land

By Louden Wings Jr.

Resource for Future Inc.

1755 Massachusetts Avenue, N.W.

Washington, D.C. 20036 - 1961

29. Transport and Public Policy

By K.M. Gwilliam - 1964

Minerva Series of Students Handbook No. 11.

30. Analytical Transport Planning

By R. Lane, T.J. Powell and P. Prestwood Smith

Duckworth - London 1971

31. Planning and Transport - The Leeds Approach

Her Majesty's Stationery Office 1969 - London

32. A Case Study of Transportation Planning in the Airport, Vingunguti light Industrial Areas in Relation to Transportation Planning of Dar-es-Salaam, Tanzania

By A.A.M. Ebrahim
Department of Urban and Regional Planning - University of Nairobi, 1972.

33. Development Proposals for Ubungo Industrial-cum-Residential Area, Dar-es-Salaam (Tanzania)

By T.P.S. Kyessi.

Department of Urban and Regional Planning

University of Nairobi - 1973.

A P P E N D I X

APPENDIX IA

QUESTIONNAIRE: JOURNEY TO WORK IN DAR-ES-SALAAM

August, 1975.

Journey to work is important to both, you and the nation as a whole. You will be more productive if you travel with ease to work.

You are therefore requested to fill this form which will help in the analysis of problems associated with journey to work.

1. Name: .....

2. Sex.....

3. Occupation:.....

4. Where do You Work.....
(Be specific: e.g. Urafiki Factory at Ubungo Industrial Area)

5. Where is Your Place of Residence.....
(Be specific e.g. Msasani, Upanga East, etc)

6. By what means to do you travel to work.....

Put a tick approximately:-

Private Car

Taxi

Bus (UDA or Co Cabs)

Bicycle

Motorcycle

Walking

Company or Government Vehicle

7. Approximately how many minutes do you spend to travel to work.....

8. Do you own a private car.....
If not; why.....

9. Do you own a bicycle.....
If not why.....

10. Do you own a moter cycle.....
If not why.....

11. What is your marital status.....

12. How many are you in the household in Dar-es-Salaam
.....

13. What is your monthly income? Put a tick at the right box

Under Shs. 300/-

Sh. 301 - Shs. 750/-

Sh. 751 - Sh. 1500/-

Sh.1501 - Sh. 2500/-

Sh.2501 - Shsand above

14. How many people in your household have a monthly income
.....

15. Put in summary from the problems you face with the means you travel with to work.....
.....
.....
.....
.....

APPENDIX IB"

QUESTIONNAIRE: SAFARI KWENDA KAZINI - DAR ES SALAAM

August 1973

Safari ya kwenda kazini ni muhimu kwako na Taifa zima. Uhisafiri kwenda kazini bila taabu ufaifanya kazi yako bila uchovu.

Unaombwa kujaza fomu hii uweze itusaidie katika kuchunguza matatizo ya wafanyakazi wakati wanakwenda na kutoka kazini:

1. Jina.....
2. Mwanamume/Mwanamke.....
3. Kazi gani unafanya.....
4. Unafanya kazi mahali gani.....
   (Jaza kwa ukamilifu, k.m. Urafiki - Ubungo)
5. Unaishi wapi.....
   (Taja kwa ukamilifu k.m. Manzese, Upanga East, n.k)
6. Unasafiria nini kwenda na kutoka kazini? (Weka alama panapohusika kwenye kisanduku.

   Gari binafsi

   Taxi

   Basi la UDA au Co Cabs

   Piki Piki

   Baiskeli

   Kwa Miguu

   Gari la Ofisini

7. Unatumia muda (taja kwa dakika) kiasi gani kusafiri toka nyumbani kwenda mahali pako pa kufanya kazi?
   .....

Chini ya Sh. 380/-

Sh. 381/- mpaka Shs. 750/-

Sh. 750/- mpaka Shs. 1,500/-

Sh.1,500/- mpaka Shs. 2,500/-

Shs. 2,500/- na zaidi

14. Watu wangapi katika familia yenu wana kipato cha mwezi Dar-es-Salaam?.....

15. Eleza kwa kifupi matatizo unayoyapata kwa chombo unacho safiria kwenda kazini.....

.....

.....

.....

.....

.....

8. Unayo gari ya binafsi?.....

   Kama huna, kwa nini?.....

9. Unayo Piki Piki?.....

   Kama huna, kwa nini?.....

10. Unayo Baisikeli?.....

    Kna huna, kwa nini?.....

11. Umeoa (Umeoleva).....

12. Nko watu wangapi katika familia yako?.....

13. Mapato yako kwa mwezi ni shilling ngapi? (Weka alama panapohusika.

APPENDIX II A

DISTANCES IN KILOMETRES FROM VARIOUS RESIDENTIAL AREAS TO THE CENTRAL BUSINESS DISTRICT

Less than 1 Km

City Centre

Upanga East

1-2 Kilometres

Kariakoo

Upanga West

2-3 Kilometres

Ilala

Fuga Industrial Area

Keko

Magomeni Mapipa

Kigamboni

3-7 Kilometres

Radio Tanzania

Chang'ombe

Temeke

Mgulani

Kurasini

Buguruni

Magomeni Mwembe Chai
Regent Estate
Magomeni Kagera

Kigogo

Kinondoni
Oyster Bay
Tandika

Mwananyamala

7-9 Kilometres

Msasani

Mtoni

Mbagala

Vingunguti

Mwenge

Mburahati

Oyster Bay (Officers Mess)

Kijito Nyama

9-12 Kilometres

Kipawa

Tabata East

Mikocheni

Sinza

Ubungo

Over 11 Kilometres

University

Kawe

Ukonga

Airport

Congolamboto

Kimara

Tabata West

Appendix II B

DISTANCES IN KILOMETRES FROM VARIOUS RESIDENTIAL AREAS TO THE PUGU ROAD INDUSTRIAL AREA

Less than ½ kilometre

Kako

½-1½ Kilometres

Area around Radio Tanzania

Chang'ombe

Ilala

Buguruni

1½-3 Kilometres

Kariakoo

Tandika

Temeke

Mgulani

Kurasini

Vingunguti

Kigogo

Kipawa

3-7 Kilometres

Tabata East

Central Business District

Magomeni (Mapipa & Mikumi)

Kagera

Mburahati

7-9 Kilometres

Mtoni

Mbagala

Airport Area

Mwenge

Kagamboni

9-11 Kilometres

Ubungo

Sinza

Kinondoni

Mwananyamala

Regent Estate

Msasani

Oyster Bay

Ukonga

Over 11 Kilometres

Oyster Bay (Police Officers Mess)

Kijito Nyama

University

Kawe

Kimara

Kigamboni

APPENDIX II C

DISTANCES IN KILOMETRES FROM VARIOUS

RESIDENTIAL AREAS TO THE UBUNGO INDUSTRIAL AREA

Less than 1 kilometre

Ubungo Residential Area

1-3 Kilometres

Sinza

Mwenge

University

3-5 Kilometres

Magomeni Kagera

Mburahati

Magomeni Mwembe Chai

Makibe

Minara

5-7- Kilometres

Magomeni Mapipa

Ngogo

Regent Estate

Kijito Nyama

Mwenmyamala

Kinondoni

Mikocheni

7-9 Kilometres

Kariakoo

Ilala

Upanga

Buguruni

Oyster Bay

City Centre

Msasani

9-11 Kilometres

Oyster Bay (Police Mess)

Keko

Chang'ombe

Kawe

Over 11 Kilometres

Radio Tanzania

Tegeta

Tandika

Ngulani

Kwesini

Mbezi

Mbagala

Vingunguti

Kipawa

Airport Area

Ukonga

Tabata East

Kigamboni

Gongolamboto

ROAD STANDARDS (CONTINUED)

PRACTICAL CAPACITIES FOR ONE-WAY URBAN ROAD

Description	6m	6.7m	7.3m	9.1m	10m	11m	12.2m	13.4m	14.6m	Remarks
	Capacity in pcu's per hour									
Urban motorway with grade separation and no frontage access			3,000			4,500			6,000	Applicable to the highest category of distributorn.
All-purpose road with no frontage access, no standing vehicles and negligible cross-traffic	2,000	2,200	2,400	3,000	3,300	3,600	4,000	4,400	4,800	Appropriate for all-purpose distributors
All-purpose street with high capacity junctions and no waiting restrictions-	1,300	1,450	1,600	2,150	2,400	2,650	3,000	3,350	3,700	Applicable to those distributors and access roads when access to development is frequent but capability is not unduly restricted by junctions
All purpose street with capacity restricted by waiting vehicles and junctions	800	950	1,100	1,650	1,900	2,150	2,500	2,800	3,200	Typical of existing roads where waiting vehicles and junctions with heavy cross traffic severely limit capacity

ROAD STANDARDS

PRACTICAL CAPACITIES FOR TWO-WAY URBAN ROADS

Effective width of carriageway in feet (excluding refuges on central reserve)	2-Lane			3-Lane		4-Lane		6-Lane			Remarks
	6m	6.7m	7.3m	9.1m	10m	12.2m	13.4m	14.6m	18.3m	20.1m	22.0m	
Description	Capacity in pcu's per hour For both directions of flow					Capacity in pcu's per hour for one direction of flow						
Urban motorway with grade separation & no frontage access								3,000			4,500	Applicable To the highest' category of distributor
All-purpose road with no frontage access no standing vehicles permitted and negligible cross traffic	1,200	1,350	1,500	2,000	2,200	2,000	2,200	2,400	3,000	3,300	3,600	Appropriate for all Purpose distributors
All-purpose street with high capacity junctions and no waiting restrictions	800	1,000	1,200	1,600	1,800	1,200	1,350	1,500	2,000 2,200	2,250 2,450 for dual carriage	2,500 2,700 ways	Applicable to the distributor and access road where access to development is frequent but capacity is not unduly restricted by junction
All purpose street with capacity restricted by waiting vehicles and junctions	300 to 500	450 to 600	600 to 750	900 to 1,100	1,100 to 1,300	800 to 900	900 to 1,000	1,000 to 1,200	1,300 to 1,700	1,500 to 2,000	1,600 to 2,200	Typical of existing road where waiting vehicles and junctions with heavy cross

APPENDIX IV

DESIGN SPEEDS OF ROADS

Primary distribution:	Urban Motorway	80 km.p.h.
Primary distribution:	All purpose	64 km.p.h.
District distribution, local distribution important access road		48 km.p.h.

RECOMMENDED LANE WIDTHS

Road Type	Single Two-Lane Carriageway	Dual or divided carriageway with at least 4 lanes
Primary Distribution	—	3.7 m.
District Distribution	3.7	3.7m normally 3.4m if the proportion of heavy commercial traffic is fairly low
Local Distribution	3.7m in industrial districts 3.4m in principal business districts. 3.0m in residential districts	—
Access Road	Principal means of access: 3.7m in industrial districts 3.4m in principal business districts 2.7m in residential districts Secondary means of access: 3.0m in industrial and principal business districts. On back roads in residential districts a two-lane width of 4m will suffice if used limited to cars	

APPENDIX V

RECOMMENDED FOOTWAY WIDTHS

Type of Road	Recommended Minimum Footway Widths
Primary Distribution: Urban Motorway	No footways
All-purpose road	2.7 m*
District Distribution:	2.7m in principal business and industrial districts. 2.4m in residential districs*
Local Distribution:	2.7m in principal business and industrial districts*
Access Road:	Principal Means of Access: 2.7m in principal business districts* 1.8m in industrial districs* 1.8m normally in residential districs 3.7m - 4.6m - adjoining shopping frontages. Secondary Means of Access: 0.9m verge instead of footway on roads in principal business and industrial districs 0.6m verge instead of footway on roads in residential districts.

* If no footway is required provide verge at least 0.9 m. wide.

APPENDIX XI

R O A D S

The previous two chapters were on the discussion of travel characteristics and the modes of travel, with much emphasis on the journey to work. In Chapter V the author intends to discuss the urban roads of Dar-es-Salaam city in terms of classification and facilities.

Roads are channels which necessitate accessibility between place to place in the urban areas. Effectiveness of travel characteristics and usage of suitable modes depends very much on the nature of

roads in a particular urban area.

It is not possible to describe all the roads in this study, only those major roads which have been of interest to us throughout the text will be discussed.

5.1 Road Classification:-

Road classification falls into 6 categories:

Freeway:- A divided arterial highway for through traffice with full control of access and grade separation at intersections.

Major Arterial Road:- A highway primarily for through traffic usually on a continuous route with partial control of access and with or without grade separation at intersections.

Minor Arterial Road:- A highway primarily for through traffic with intersections at grade. Usually connects major activity centre in the city.

Collector Road:- A highway servicing the internal traffic movements within an area of the city and connecting this area to the Arterial Road system and with direct access to abutting property and with intersections at grade.

Local Road:- A road primarily for access to residence, business or other abutting property.

Parkway:- A scenic road with full or partial control of access, and located within a parked or a ribbon of park development.

From the above classification the major roads in Dar-es-Salaam can be calssified as follows:

a. Freeway: Not there at the moment

b. Major Arterial: Bagamoyo Road
Morogoro Road
Pugu Road
Kilwa Road

c. Minor Arterial: United Nations Road
Swahili Road
Maimbani Street
Uhuru Street
Independence Avenue
Gerezani Street
City Drive & Azania Front

Ocean Road

Kaletaba Street

Libya Street

Jamuhuri Street

Umoja wa Wanawake Street

Morocco Road

The other roads are too numerous and require no special attention for our purpose. Map No. shows some major roads.

3.2 Road Facilities:

The quality of a road depends on the facilities it has. The facilities considered for roads are road width, number of lanes, kerbs, side walks, cycle tracks, bays, traffic controls, capacity design, pavement conditions, street lighting, surfacing and drainage. Of course for our purpose not all are of interest to us. Table No. 36 shows the major roads of Dar-es-Salaam which have been of interest in this text and the availability of facilities. The table reveals how most of the roads are in extremely poor condition except Pugu Road which is under construction and it will have all the necessary facilities. Road improvement is a necessity in Dar-es-Salaam.

D! OVERALL CHOICE OF MODE OF TRAVEL (AS PER RESEARCH):

D1 RESIDENTS AT VARIOUS DISTANCES FROM CENTRE OF WORK:

DIST TO WORK CENTRE	0 TO 1	1 TO 3	3 TO 5	5 TO 7	7 TO 9	9 TO 11
NUMBER OF PEOPLE	172	312	580	768	396	72
NUMBER WALKING	152	168	168	96	40	0
NUMBER USING BICYCLES	0	0	0	0	0	0
NO. USING MOTORCYCLES	0	8	0	8	8	0
USING PUBLIC SERVICE	8	56	312	568	304	56
USING PRIVATE CARS	8	8	8	16	8	0
USING OFFICE TRANSPORT	4	72	92	80	36	16

ANALYSIS OF CHOICE OF MODE OF TRAVEL TO WORK (DAR-ES-SALAAM ,AUGUST 1975)- BY; AYOOB OMARI - JANU

K: CHOICE OF MODE OF TRAVEL AS RELATED TO INCOME:

	0 - 380	381 - 750	751 - 1500	1501-2500	2500+
NUMBER WALKING	192	392	40	8	0
% OVERALL	8.0000	16.3333	1.6666	0.3333	0.0000
NUMBER USING BICYCLES	0	0	0	0	0
% OVERALL	0.0000	0.0000	0.0000	0.0000	0.0000
NO. USING MOTORCYCLES	0	8	8	8	0
% OVERALL	0.0000	0.3333	0.3333	0.3333	0.0000
USING PUBLIC SERVICE	336	928	96	24	0
% OVERALL	14.0000	38.6666	4.0000	1.0000	0.0000
USING PRIVATE CARS	0	0	24	8	16
% OVERALL	0.0000	0.0000	1.0000	0.3333	0.6666
USING OFFICE TRANSPORT	44	112	128	28	0
% OVERALL	1.8333	4.6666	5.3333	1.1666	0.0000

RECORDS PROCESSED = 2400

ANALYSIS OF CHOICE OF MODE OF TRAVEL TO WORK (DAR-ES-SALAAM ,AUGUST 1975)- BY; AYOOB OMARI - JANU

	D2	PERCENTAGE OF CHOICE OF MODE PER LENGTH:				
DIST TO WORK CENTRE	0 TO 1	1 TO 3	3 TO 5	5 TO 7	7 TO 9	9 TO 11
% NO OF PEOPLE	7.1666	13.0000	24.1666	32.0000	16.5000	3.0000
% NO WALKING	24.0506	26.5822	26.5822	15.1898	6.3291	0.0000
% NO USING BICYCLES	88081.1013	88081.1013	88081.1013	88081.1013	88081.1013	88081.1013
% NO USING MOTORCYCLES	0.0000	33.3333	0.0000	33.3333	33.3333	0.0000
% USING PUBLIC SERVICE	0.5780	4.0462	22.5433	41.0404	21.9653	4.0462
% NO WITH PRIVATE CARS	16.6666	16.6666	16.6666	33.3333	16.6666	0.0000
%USING OFF. TRANSPORT	1.2820	23.0769	29.4871	25.6410	11.5384	5.1282

	NO IN MODE	192	0	0	472	8	28	700
	% WITHIN MODE	30.3797	0.0000	0.0000	34.1040	16.6666	8.9743	
	% OVERALL	8.0000	0.0000	0.0000	19.6666	0.3333	1.1666	
4. LAST STAGE TO OFF.								
	NO IN MODE	0	0	0	32	0	0	32
	% WITHIN MODE	0.0000	0.0000	0.0000	2.3121	0.0000	0.0000	
	% OVERALL	0.0000	0.0000	0.0000	1.3333	0.0000	0.0000	
5. CONVENIENCE								
	NO IN MODE	360	0	8	888	16	48	1320
	% WITHIN MODE	56.9620	0.0000	33.3333	64.1618	33.3333	15.3846	
	% OVERALL	15.0000	0.0000	0.3333	37.0000	0.6666	2.0000	
6. PETROL								
	NO IN MODE	0	0	0	0	8	8	16
	% WITHIN MODE	0.0000	0.0000	0.0000	0.0000	16.6666	2.5641	
	% OVERALL	0.0000	0.0000	0.0000	0.0000	0.3333	0.3333	

ANALYSIS OF CHOICE OF MODE OF TRAVEL TO WORK (DAR-ES-SALAAM ,AUGUST 1975)- BY: AYOOB OMARI - JANUARY,1976

F: CHOICE OF MODE OF TRAVEL AS-RELATED TO SEX;

	WALKING	BICYCLE'	MOTORCYCLE'	PUBLIC'	PR/CAR	OFF/TRANS	TOTAL.
FEMALES	180	0	0	448	0	28	556
% OVERALL	3.3333	0.0000	0.0000	18.6666	0.0000	1.1666	
% WITHIN SEX	14.3884	0.0000	0.0000	80.5755	0.0000	5.0359	
% WITHIN MODE	12.6582	0.0000	0.0000	32.3699	0.0000	8.9743	
MALES	552	0	24	936	48	284	1844
% OVERALL	23.0000	0.0000	1.0000	39.0000	2.0000	11.8333	
% WITHIN SEX	29.9349	0.0000	1.3015	50.7592	2.6030	15.4013	
% WITHIN MODE	87.3417	0.0000	100.0000	67.6300	100.0000	91.0256	

G: OVERALL OWNERSHIP OF MODE OF TRAVEL:

	NO. OF PEOPLE	% OWNERSHIP
NONE OF THESE BELOW	2308	96.1666
BICYCLE	8	0.3333
MOTORCYCLE	28	1.1666
PRIVATE CARS	56	2.3333

ANALYSIS OF CHOICE OF MODE OF TRAVEL TO WORK (DAR-ES-SALAAM ,AUGUST 1975)- BY: AYOOB OMARI - JANUARY,1976

N: REASONS FOR NOT OWNING INDIVIDUAL MODES OF TRAVEL:

	0 BICYCLE'	MOTORCYCLE	0 PR/CAR	0	OAL
A. NO WITHIN MODE	2392	2372	2344		
% OVERALL	99.6666	98.8333	97.6666		
B.1 RISK					
A. NO WITHIN MODE	300	32	0		
% OVERALL	12.5000	1.3333	0.0000		
% WITHIN MODE	12.5418	1.3377	0.0000		
2 MONEY					
A. NO WITHIN MODE	1756	2176	2328		
% OVERALL	73.1666	90.6666	97.0000		
% WITHIN MODE	74.0303	91.7369	98.1450		
3 OTHER REASONS					
A. NO WITHIN MODE	336	164	16		
% OVERALL	14.0000	6.8333	0.6666		
% WITHIN MODE	14.3344	6.9965	0.6825		

ALYSIS OF CHOICE OF MODE OF TRAVEL TO WORK (DAR-ES-SALAAM ,AUGUST 1975)- BY: AYOOB OMARI - JANUARY,1976

I: OWNERSHIP AND CHOICE OF MODE OF TRAVEL AS RELATED TO FAMILY SIZE:

		<---------- FAMILY SIZE---------->						<---------- WORKERS IN FAMILY ----						
		1 UPTO 3		3 UPTO 6		7 UPTO 9		ABOVE 10		<---1 --->		<--- 2 -->		<-- 3 -->	
		NO	%GE	NO	%GE	NO	%GE	NO	%GE	NO	%GE	NO	%GE	NO	%GE
LK/PUBL.SERVE.	CHOICE	828	34.50	804	33.50	424	17.66	252	10.50	1856	77.33	320	13.33	80	3.33
CYCLE	OWNERSHIP	0	0.00	0	0.00	0	0.00	8	0.33	8	0.33	0	0.00	0	0.00
TORCYCLE	OWNERSHIP	4	0.16	16	0.66	8	0.33	0	0.00	28	1.16	0	0.00	0	0.00
IVATE CAR	OWNERSHIP	16	0.66	32	1.33	8	0.33	0	0.00	40	1.66	16	0.66	0	0.00