

COST AND COST PRICE ANALYSIS OF THE
TRANSPORTATION OF GOODS IN RHODESIA

by

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PREFACE

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To Mr. H. Lustig, Managing Director of Associated Industrial Consultants (Pty) Limited, my sincerest thanks for his consent to my using this report and for the valuable discussions I was able to have with him.

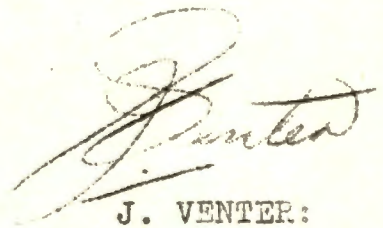
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PART I - TRANSPORTATION ORGANIZATION AND
CRITERIA FOR A LONG-TERM
TRANSPORTATION POLICY

In this part of the study a description is provided of the objectives, limitations and method of approach. The transportation organizational structure required for the planning, control and co-ordination of the Rhodesian transportation industry is considered. The importance and the function of the cost of transportation in the determination of a long-term transportation policy are dealt with.

CHAPTER 1

I N T R O D U C T I O N

1.1. The object of this study:

The need for and the importance of an efficient goods transportation system in the national economy of any country need not be elaborated on. The basic objective of this study of the Rhodesian transportation situation is directed at developing a framework for a long-term policy which could lead to a "maximum" goods transportation industry in Rhodesia.

A "maximum" transportation industry can be defined as that transportation industry.. in which the maximum and most economical use is made of the scarce productive resources which are available to the various competitors in the industry and which are used in producing the required transportation output to meet the demand for that output.

The following primary factors must necessarily be taken into account in a transportation study of this nature:-

- a. the organizational structure of the transportation industry which is considered necessary to co-ordinate and guide it towards a "maximum" goods transportation industry,
- b. the cost of goods transportation; and
- c. interim measures in order to work towards the ultimate long-term transportation policy.

1.2. The organizational structure and co-ordination of the transportation industry:

The transportation of goods should be seen as an integrated system, although many competitors are present, which has as its basic objective the maximization of the performance of the transportation industry, in relation to the supply, demand and cost of transportation.

In order to achieve the above, it should be obvious that a proper and centralised co-ordination of the transportation industry is essential. The task of co-ordinating the transportation industry rests on the shoulders of the Government, who must aim at eliminating the wasteful effects of unplanned long-term capital investment and the uneconomic use of other scarce resources which are associated with that investment.

"To the Government and its agencies has fallen the task of acting as arbiter in the competitive struggle in transportation which is only self-regulatory in a few limited fields...." C. Verburgh, South African transportation policy, Bureau for Economic Research, University Stellenbosch 1961, page 3.

The Government must create an adequate transportation organization which will be responsible for co-ordinating the transport operations of the various competitors. This co-ordination will be guided not only by the supply of but also by the demand for transportation capacities and the cost of transportation.

1.3. The cost of goods transportation:

In developing a long-term transportation policy which must guide the transportation industry to its objective, it is essential that a study be made of the cost of transportation, as seen from the points of view of both the users as well as the suppliers of transportation.

The cost of transportation becomes one of the guiding principles in co-ordinating the transportation capacities and services offered by alternative competitors. It is through a study of the cost of transportation that insight is gained into the economic use of the scarce resources required to produce the given transportation output.

1.4. Interim measures:

As a long-term transportation policy cannot be put into effect overnight, consideration must be given to the introduction of interim measures which will guide the industry to its ultimate objective.

1.5. Limitations of this study:

This study is limited in its scope as only the internal transportation of goods within Rhodesia has been considered, i.e. excluding imports, exports and traffic which is in transit.

The transportation facilities subject to the study are restricted to rail and road motor transport only. Air transportation of goods and passenger transportation by rail, air and road have been excluded from the study.

The statistical information used in the study is basically for the calendar year 1965. Since post U.D.I. information was not made available, a determination of future transportation requirements could not be attempted. The structural changes experienced in Rhodesia after 1965. will most certainly have a significant effect on future transportation requirements. As a result of the inavailability of post U.D.I. information and the break-up of the Rhodesia Railways, no attempt has been made to compile a prognosis of transportation supply and demand.

The Road Motor Services operated by the Rhodesia Railways have also been excluded from the study, since their operation can be considered to be very closely linked with and burdened by the public service obligations which have to be met by the Government.

Despite the above limitations, however, the information used provided such an adequate picture of the order of magnitude of the competition between the various suppliers of transport, that the formulation of a long-term transportation policy for Rhodesia was attempted.

1.6. Method of approach:

This study is divided into four parts:

Part I: Transportation organization and criteria for a long-term transportation policy:

In this part of the study attention is given to the planning, control and co-ordination of the Rhodesian transportation industry. (chapter 2).

The importance and the function of the cost of transportation, from the points of view of both users and suppliers, in the determination of a long-term transportation policy are dealt with in chapter 3.

Part II: Requirements of a long-term transportation policy:

Since the implementation of a long-term transportation policy is dependent on the determination of transportation costs, chapter 4 deals with an approach which could be adopted by the Rhodesia Railways to determine transportation costs in respect of different goods or categories of goods.

In chapter 5 an approach is outlined which could be employed to establish road transportation costs in respect of various categories of goods. This chapter also provides an outline of a technique which could be used to effect a comparison between rail and road transportation costs, in respect of different goods, or categories of goods.

Apart from a knowledge of the costs relative to rail and road transportation it is also essential for the purpose of planning, controlling and co-ordinating the transportation industry that information be available as regards the demand for and supply of transportation capacities. Chapter 6 gives an approach which could be adopted in building a "transportation intelligence system." which would yield the required information

Part III: Interim measures:

Considering that a long-term transportation policy cannot be put into effect overnight, possible interim measures which in the meanwhile could yield certain economic and other benefits are discussed in chapter 7. The basis for the formulation of interim measures is again the cost of transportation relative to the alternative media of rail and road in competition with one another.

Certain interim measures considered in chapter 7 result in a proposed diversion of goods transportation from rail to road, and vice versa. The possible cost effects of this diversion are considered in chapter 8.

Part IV: Summary:

A summary of the study is provided in chapter 9.

(Refer Annexure 1 , pages A2 to A11 for the views of the Association of the Rhodesian Industries on what should be included in a study of the transportation situation in Rhodesia. Comments on this memorandum are provided in pages A17 and A18 of Annexure 1).

CHAPTER 2

THE ORGANIZATIONAL STRUCTURE REQUIRED FOR THE PLANNING, CONTROL AND CO-ORDINATION OF THE RHODESIAN TRANSPORTATION INDUSTRY

2.1. Introduction:

The economic objective of any government can only be to pursue a policy which will result in the maximum utilization and development of the country's scarce resources. The limitations imposed on this utilization and development are the result of the extent of the market for the products of the economic activities.

The extent of the market on the one hand and the application of scarce resources required to create or develop economic goods on the other hand, necessarily lead to the question of priority determination. This question has become one of greater significance in Rhodesia since U.D.I. Sanctions have forced structural changes on the national economy and on the utilization of Rhodesia's scarce resources and the country has had only one alternative, namely, to adapt or else die-out.

Rhodesia is having to adapt at present and challenge after challenge is met with increasing determination and vigour. This adaptation process can only be effective if it is based on sound long-term economic planning in which the question of priority determination plays an important role.

Various recommendations have in the past been made in respect of creating organizational frameworks within the Government, which had as their basic aim the economic planning and priority determination for the total economy of the country. •

In Chapter V page 46 of a report by an advisory committee consisting of J. Phillips, J. Hammond, L.H. Samuels and R.J.M. Swynner - "The development of the economic resources of Southern Rhodesia with particular reference to the role of African agriculture" - (1962), certain recommendations were made with respect to the "organization, planning and action, essential for satisfactory, social and economic development".

Similarly, in a very recent report by J.L. Sadie, ("Planning for the economic development of Rhodesia" 1967 - Printed by the Government Printer, Salisbury) recommendations were made in Chapter III, page 36, as regards the "Administrative Machinery for economic development."

The advantages and disadvantages of the organizational structures proposed in the above mentioned reports on central economic planning will not be discussed since they do not fall within the basic framework of this study. Of importance, however, is the fact that the Rhodesian Government must introduce a central economic planning organizational structure to study economic priority problems.

Because of its tremendous importance in the national economy of the country, the transportation sector should be strongly represented on such an organizational structure. In order to produce a significant contribution to a central economic planning body the transportation industry must pursue a policy which will lead to an economic and efficient transportation system. This will only be possible if an organizational structure is created within the transportation industry which can direct the industry on a planned, controlled and co-ordinated basis.

2.2. Proposed transportation organizational structure:

In order to achieve an economic and efficient transportation system it is essential for the purpose of planning and co-ordination in the transportation industry that an organizational structure be created to assist the Ministry of Roads and Road Traffic and the Ministry of Transport and Power in their respective tasks. (These Ministries are served by a single Minister). An organizational structure which makes provision for the following, is proposed:-

2.2.1. A Transportation Advisory Council:

The proposed detailed composition of the Transportation Advisory Council is indicated on chart 1 on the next page.

The Council would act as an advisory body to the Minister on any matters concerning transportation in Rhodesia.

The composition of the Council should be such that all parties who have an interest in transportation are represented on the Council, such as, transportation suppliers, transportation users and government transport officials.

The chairman of the Council should be appointed by the Minister for a period of, say, three years, but should not be a government official.

The Council would result in an effective medium for consultation with the various sectors of the economy which use and supply transportation on any matters affecting the transportation industry.

CHART 1

TRANSPORTATION ADVISORY COUNCIL MEMBERS:

1. Chairman.
2. Assistant Chairman. (Transportation Research Economist).
3. Public Service Hauliers.
4. Association of Rhodesian Industry.
5. Commerce.
6. Rhodesia Farmers National Union.
7. Chamber of Mines.
8. Travel/Tourist Agents.
9. Ministry Members (various).
10. Rhodesia Railways.
11. Rhodesia Airways.
12. Secretary.

(Refer also page 10)



CHART 2

TRANSPORTATION PLANNING AND CO-ORDINATION BOARD:

- | | |
|---------------------------------------|------------------------|
| 1. Minister | - Chairman. |
| 2. Secretary | - Ministry Transport. |
| 3. Commissioner | - Ministry Roads. |
| 4. Chairman | - Rhodesia Railways. |
| 5. Chairman | - Rhodesia Airways. |
| 6. Chairman | - Road Services Board. |
| 7. Transportation Research Economist. | |
| 8. Secretary. | |

(Refer also page 12)

2.2.2. Transportation Planning and Co-ordination Board:

The Transportation Planning and Co-ordination Board should consist of the Government Officials, and members of the Railways and Rhodesia Airways as indicated on chart 2 on the previous page.

This Board's basic objective should be the optimization of the performance of the transportation industry in relation to the supply of transportation capacity, the demand for that capacity, the cost of and the investment in the transportation industry. This can only be achieved by centralized planning and control which, together with centralized co-ordination, rest on the shoulders of the Government.

Efficient planning and co-ordination in the short-term, as well as on the long-term, should logically lead to the elimination of the wasteful effects of unplanned long-term capital investment and the uneconomic use of other scarce resources which are associated with that investment.

In order to achieve an efficiently planned and co-ordinated transportation industry it is essential that detailed knowledge and information in respect of the following aspects of the transportation industry be built up:-

1. The cost of transportation relative to the competitors who supply transportation facilities.
2. The supply of transportation capacities.
3. The demand for transportation capacities.
4. The investment in transportation capacities.

The function of collecting and studying the above information should be the prime responsibility of a transportation research economist, who should be appointed as early as possible. In order to be able to study the various aspects of transportation it is essential that the transportation research economist's first task be to develop and organize a transportation "economics intelligence system". A system of this nature should logically involve both transportation users and suppliers.

In chapter 6 a basic approach is developed which could be adopted in building a transportation intelligence system for the purpose of co-ordinating the supply of transportation capacities with the demand for these capacities.

The transportation research economist should be a member of the Transportation Advisory Council and the Transportation Planning and Co-ordination Board. The success of the implementation of any future policy will be directly correlated with the successes achieved by the transportation research economist.

2.2.3 Road Service Board:

The existing Road Service Board as regards its' composition should be changed in such a way that the transportation research economist is made a full-time member of the Board. The function of this Board is to sit at regular intervals to decide on the granting of road transportation permits.

The guiding principles in the granting of these permits should be as follows:-

1. Factual information relative to transportation supply, demand and costs and the financial and organizational operating ability of the applicant should form the basic criteria on which permits are granted. It is felt that less emphasis should be laid on legal procedures and aspects in the granting of permits than is experienced at present in the Road Service Board.
2. Where possible new road transportation permits should only be issued to large firms of Public Service Hauliers. The objective of this move would basically be to consolidate road transportation in the hands of a limited number of financially strong Public Service Hauliers. Liaison with and the control of a limited number of hauliers would thereby be simplified.
3. Applicants' right of appeal should be abolished, but the Board could rule that a fresh application would be considered after a given period of time.
4. Objections from existing Road Service Hauliers should still be heard, although the Board should develop the approach of protecting existing hauliers who could probably render services most economically.
5. Objectors' right of appeal should also be abolished.

(Refer Annexure 2, for selected comments of Public Service Hauliers).

In order to function efficiently each application should be subjected to research by the Board's research team under the guidance of the transportation research economist. Sufficient time should, therefore, be allowed before applications are considered. Since a strong relationship would exist between this Board and the Transportation Planning and Co-ordination Board, the operations of the Road Service Board should be guided by the policy decisions of the Minister.

(Cf. C. Verburgh, South African transportation policy, Bureau for Economic Research, Univ., Stellenbosch 1961, pages 31 to 39.) It is interesting to note that a single Ministry of Transport exists in South Africa. In Rhodesia, however, two ministries are in operation, viz., the Ministry of Transport and Power, and the Ministry of Roads and Road Traffic. These two ministries are headed by a single minister and co-ordination is, therefore, effected through this minister. It is recommended that a study should be undertaken to establish whether these two ministries could not successfully be combined into a single ministry.

In accordance with the Transport Act, 1962 in England four independent boards were created to take over the principal functions of the British Transport Commission. The Boards were: the British Railway Board, the London Transport Board, the British Waterways Board and the British Transport Docks Board. In accordance with the Transport Act, 1962 Section 55, a Nationalized Transport Advisory Council was created to co-ordinate the policies between the various boards. In Rhodesia the proposed Transportation Planning and Co-ordination Board could be considered as the equivalent of this body. (Cf. A.M. Milne, The economics of inland transport, second edition by J.C. Laight, Pitman, London 1963, pages 74 and 75).

CHAPTER 3

THE COST OF TRANSPORTATION

3.1. Introduction:

In this chapter a brief outline is given of the importance and the function of the cost of transportation in the determination of a long-term transportation policy. Costs will be analysed from the point of view of the user as well as from that of the supplier of transportation. The costs of the transportation supplier effect the user's costs and decisions. The user's total costs are, therefore, a function of the supplier's costs and any wastages and inefficiencies incurred by the supplier could become a burden to the user and the national economy as a whole.

If the transportation industry consisted of a single supplier and a single user only, the solution to the cost problem would be relatively simple, since a multitude of tools are available for the purpose of obtaining a better utilization of scarce resources, thereby reducing costs.

In practice, however, the situation is very much more complex, since various suppliers compete on common grounds to satisfy the requirements of a large number of transportation users.

Alternative suppliers use various scarce resources in different combinations and the economic efficiency of the use of these resources is reflected in the supplier's respective costs. As the resources are used in different combinations to produce a required output, it is obvious that their cost will also differ. A transportation policy which is cost-orientated should, therefore, be developed which would result in restricting the operations of suppliers to those fields in which they could make the most economic use of the available scarce resources.

The supplier's cost of transportation does not represent the full transportation cost picture, since the user also incurs other costs in the transportation process.

3.2. User costs:

One of the determining factors in choosing a particular medium of transportation in preference to another is the cost of that transportation medium to the user. A once-and-for-all answer relative to the user's cost of alternative means of transportation is not possible, since these costs vary with the given circumstances and conditions pertaining to the particular need for that transportation.

From the user's point of view this transportation cost includes the freight rate charged by the supplier of the transportation service as well as other cost factors which could be any of the following:-

- a. The cost consequence of having an assortment of goods on route where the choice lies between a cheaper slow transportation medium and a faster more expensive one.
- b. The cost consequence of having to choose between a door to door transport facility or having to employ one's own transport to deliver and collect one's goods to and from a terminal.
- c. The risk of breakages and their cost consequences relative to alternative means of transportation.
- d. The cost of packaging which in many instances depends on the type of transport used.
- e. The risk/cost consequences of losing customers as a result of any of the factors mentioned above.

The user's total cost which is composed of the freight rate plus his other costs can best be determined by the particular user in his given circumstances. In order to be able to make an optimum decision the user must, therefore, have a freedom of choice as regards the various transportation mediums available to him.

The user's choice will be indicative of the inherent economic advantage of the medium of transportation which he has selected for his given circumstances.

(Cf. H.M. Schönfeld, *Kostenrechnung*, (third impression), Stuttgart Poeschel, pages 93 to 96, and M. Beckman, C.B. McGuire and C.B. Winsten, *Studies in the economics of transportation*, Yale University Press, New Haven, 1956, pages 113 to 117, as regards "transit time and inventory costs" to the user).

3.3. The effects of supplier costs on the user's total costs:

In choosing between alternative transportation mediums to have his goods transported, the user has to consider and compare the total transportation costs involved in each instance in order to make the best decision in his particular user circumstances. The total transportation costs to the user are composed of the supplier's total cost, plus the profit margin which the supplier allows himself, plus any other user costs which the user will incur if a particular transportation medium is chosen. The supplier's total cost plus his profit margin are equal to the freight rate which the user pays for the performance of the transportation operation.

Alternative suppliers competing on common grounds have different total costs due to differences in the scarce resources used by them and it is, therefore, essential that they compete on fair grounds for the transportation demand created by the users.

To illustrate the effects of supplier costs, supplier profit margins and other user costs, as well as the concept of "competition on fair grounds", the following hypothetical transportation cost situations for a given tonnage and distance are considered:-

Situation A:

Alternative transportation mediums	Supplier's total cost	Freight rate	Supplier's profit margin	Other user costs	User's total cost
A1	£100	£140	£40	£10	£150
B1	£120	£135	£15	£ 8	£143

Based on the user's total cost, it is logical to assume that the user would make use of alternate B1.

Situation B:

Alternative transportation mediums	Supplier's total cost	Freight rate	Supplier's profit margin	Other user costs	User's total cost
A2	£100	£100	Nil	£10	£110
B2	£120	£120	Nil	£ 8	£128

This situation is basically the same as situation A with the exception that both transportation mediums A2 and B2 have only recovered the supplier costs. The user would this time undoubtedly choose medium A2 for the transportation of his goods.

Situation C:

Alternative transportation mediums	Supplier's total cost	Freight rate	Supplier's Profit Margin	Other user costs	User's total cost
A3	£100	£120	£20	£10	£130
B3	£120	£140	£20	£ 8	£148

The only condition which has been changed in this situation is that both suppliers have settled for the same profit margin, viz., £20. The user would again choose transportation medium A3.

Situation D:

Alternative transportation mediums	Supplier's total cost	Freight rate	Supplier's profit margin	Other user costs	User's total cost'
A4	£100	£120	£20	£30	£150
B4	£120	£140	£20	£ 8	£148

Situation D differs from situation C only as regards "other user costs", since these costs for A4 have been increased from £10 to £30. In this situation the user would choose transportation medium B4. This situation has been included merely to illustrate the effect of "other user costs" in the user's decision.

(Cf. C. Verburgh, op. cit., page 42 Table no. 1).

3.4. Conclusions which can be drawn from the above cost situations:

The user's total cost, which is a function of the freight rate and user's other costs, is the determining factor as regards the user's choice of transportation. It should be kept in mind that the user's other costs include a cost which reflects the inherent advantages or disadvantages of alternative transportation mediums in given circumstances.

From a national economic point of view the user made one wrong choice in the first three situations, namely in situation A, where transportation medium B1 was chosen. Situations A, B and C were basically the same and a consistent choice should, therefore, have been made, viz., medium A1, A2 and A3, respectively. The reason for this inconsistent choice can basically be attributed to the fact that in situation A the freight rates do not reflect the supplier's total cost of transportation, but have been distorted by the difference in the profit margins of the two alternatives.

A further conclusion which can be drawn is that the supplier's total cost for transporting a given tonnage over a given distance should be the deciding factor in determining whether alternative mediums of transportation are in fact competing on fair grounds as regards the national economic supply of transportation capacity. Freight rates should, therefore, reflect these costs, since the user is acquainted only with the rates and not the supplier's costs.

(Cf. E.C. Pool, Costs - a tool for railroad management, Simmons - Boardman Publishing Corp., New York 1961, pages 74 and 75).

3.5. Recommendations:

Based on the theoretical arguments above the following recommendations are made:-

- a. Freight rates or tariffs of alternative goods transportation mediums should be made to reflect the supplier's total costs. Alternative freight rates should differ with at least the same amount from the respective supplier's total costs. The Rhodesian Government should, therefore, introduce freight rates which provide a just reflection of the transportation costs of alternative suppliers.
- b. The transportation user should be given the right to choose that transportation medium which will result in the least total cost to him in his particular circumstances.
- c. The freedom of choice of the user implies that transportation suppliers must be afforded equal treatment as regards their competition within the imposed freight rates.

These recommendations form the principal criteria on which Rhodesia should base its' long-term transportation policy.

(Cf. General transportation policy and user-carrier competition, International Chamber of Commerce, Paris 1951, pages 9 and 12).

3.6. Accepted criteria:

The above principal criteria of freight rates which reflect transportation costs, user's freedom of choice and equal treatment of suppliers are by no means new and have been advocated before as the best way in which to build a framework for an economically sound long-term transportation policy.

A.M. Milne (The economics of inland transportation Policy, second edition by J.C. Laight) provides an excellent treatise on the criteria involved in formulating a transportation policy. The basic criterion, however, remains the cost of transportation.

"The constant reiteration of the question - 'At what cost?' may prove annoying and, at times, frustrating but it is the duty of the economist to remember that a high standard of living is not a heaven-sent gift, but the result of an efficient use of scarce resources of labour and capital and that the achievement of an efficient use of the resources requires attention to be paid to relative economic costs in the sphere of transport no less than in other spheres of productive activity." - A.M. Milne, op. cit., page 267.

3.7. The challenge imposed on Rhodesia in accepting the above three principal criteria as the foundation stone of a sound long-term transportation policy:

The extent of the challenge which would be imposed on the Rhodesian Government in accepting the basic principal criteria of freight rates which reflect costs, the user's freedom of choice and equal treatment of transportation suppliers would mainly be a function of the adequacy and the availability of transportation costs in respect of the alternative transportation mediums which operate in Rhodesia.

Before a sound long-term transportation policy could be introduced, it would be essential that the cost of transportation be determined for the various goods or categories of goods which can be transported by the alternative transportation suppliers.

The existing tariffs of the Rhodesian Railways do not reflect the transportation costs of the goods concerned and this situation would necessarily have to be changed to meet with the basic requirements of the proposed long-term transportation policy. Road transporters who are in direct competition with the Railways on main line routes are bound by agreement to charge at least the railway tariffs.

In the next chapter a cost and cost price analysis framework is developed, which could be used to determine the cost of transporting particular goods or categories of goods by the Railways and road transportation suppliers.

Once these costs have been determined tariffs could be introduced which would reflect transportation costs of the alternative competitors. Just as a cost break-even position in terms of distance would occur, a tariff break-even would also occur at the same distance.

In terms of the costs of alternative suppliers short distance traffic would tend to be forced to use a certain transportation medium, whilst long distance traffic would be forced to use other transportation mediums.

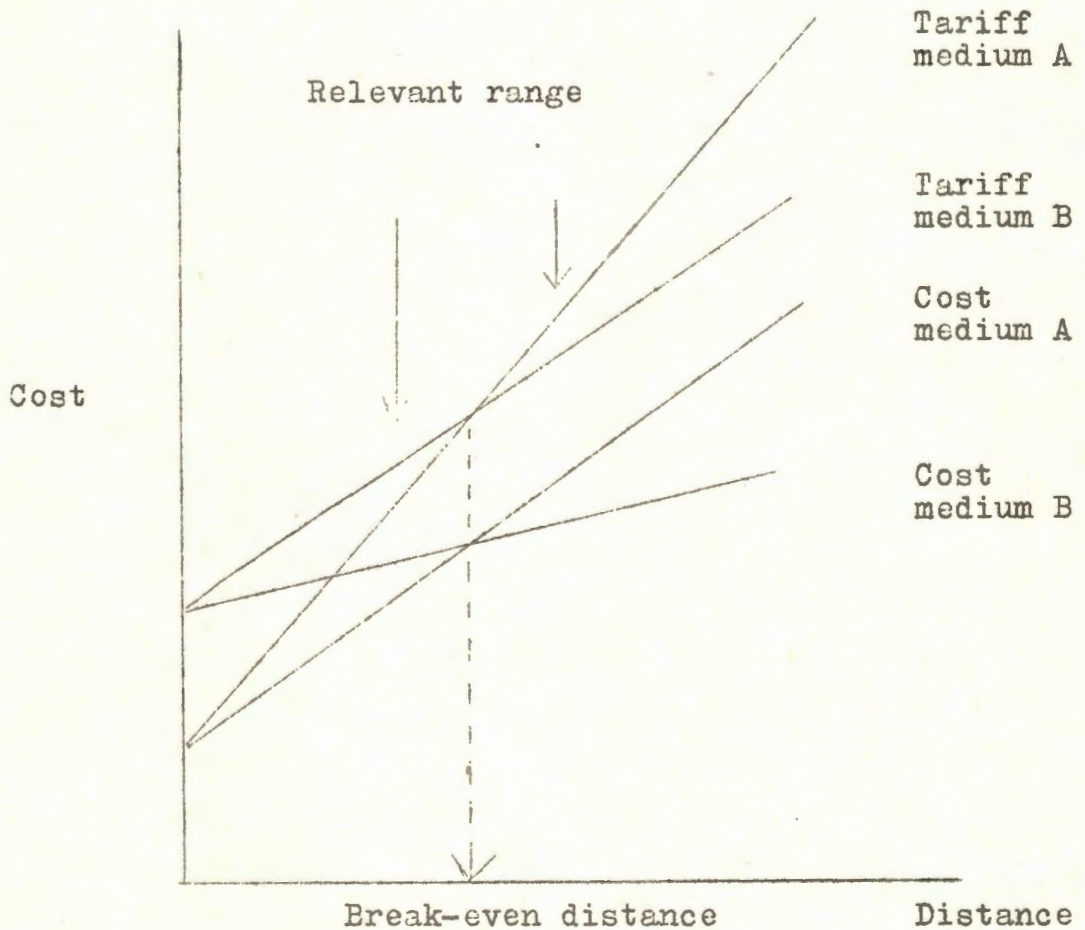
Although the alternative supplier tariffs would indicate a given break-even distance, the user's other costs would be the determining factor in choosing the most economic transportation medium for his particular circumstances. On the next page a graph on hypothetical tariffs and transport costs is provided to illustrate how the tariffs and supplier costs would both have the same break-even distance.

Since the proposed long-term transportation policy could not be introduced overnight, it is essential that an interim transportation policy be considered. Measures which could be adopted for an interim policy are considered in chapter 6.

(Cf. K. Käfer, Standardkostenrechnung (2nd impression) Verlag des Schweizerischen Kaufmännischen Vereins, Zürich 1964, page 263).

/Graph

3.8. Hypothetical cost and tariff break-even graph for a given tonnage of goods:



(Cf. S. S. Tucker, The break-even system—a tool for profit planning, Prentice Hall, New York, page 77 to 96 and 131 to 154).

PART II - REQUIREMENTS OF A LONG-
TERM TRANSPORTATION POLICY

In this part of the study approaches are developed for the determination of transportation costs in respect of different goods and categories of goods by rail and road respectively. A technique for the comparison of rail and road transportation costs is outlined. An approach for the building of a "transportation intelligence system" which would yield information on the demand for and supply of transportation capacities is also given.

CHAPTER 4

AN APPROACH TO A TRANSPORTATION COSTING SYSTEM FOR THE RHODESIA RAILWAYS

4.1. Introduction:

In this chapter emphasis is laid on developing an approach to transportation costing which could be employed by the Railways for the operations relative to the transportation of goods.

The reason for this is that the success of a long-term transportation policy for Rhodesia depends to an extremely large extent on the costing system employed by the Railways.

In short, the present position in the Railways is as follows:-

- a. Railway tariffs which are in force do not reflect transportation costs. This is evident from the fact that the Railways do not make provision for cost determination in respect of various tariff groups.
- b. The profitability of the Railways is, in principle, a function of the following equation:-

$$P = (\sum X_1 Y_1 + \sum X_2 Y_2 + \dots \sum X_n Y_n) - Z$$

Where P =

- Where P = Profit or loss in total.
- X = Average transportation tariff in
 respect of one ton-mile transport for
 the various tariff classes "1" to "n".
- Y = The total ton-mile transportation in-
 volved in respect of each of the
 tariff classes "1" to "n".
- Z = Fixed cost + variable cost + semi-
 variable cost.

It is of course difficult to determine to what extent different types of traffic (tariff classes) contribute to the profitability, or otherwise, of the Railways.

- c. One must assume that a substantial amount of cross-subsidisation in fact is taking place and that certain traffic, namely the high rated tariff goods, is subsidising low tariff goods.

The profit or loss of the Railways can in effect only be calculated after the event has taken place. A post-cost calculation thus determines the profitability or otherwise of the railway operations.

The introduction of a costing system which makes provision for transportation costs relative to particular goods or categories of goods, forms the basic requirement for a maximum transportation system based on the principle of tariffs reflecting transportation costs.

The Rhodesia Railways is by no means in a unique situation in that their costing system does not provide an indication of the transportation costs of particular goods or categories of goods.

Of importance, however, is that a positive attempt should be made to work towards a costing system which could provide a reasonable objective measure of the cost involved in the transportation of goods or categories of goods. A knowledge of goods transportation costs would enable the Railways to establish what the magnitude is of the contribution to profit (or loss) of particular goods or categories of goods.

A tendency exists in railway organisations throughout the world today to accept transportation costs as one of the most important criteria for determining tariffs.

(Cf. C.G.W. Schumann, M.D. Marais and others,
Verslag van die komitee insake spoor-
wegtariefbeleid en die nywerheidsvestiging
in Suid Afrika, Johannesburg 1964,
page 58.)

This tendency is also recognised in Rhodesia. This was already evidenced in a report published in 1959 by the "Commission of Inquiry into the rating structure of the Rhodesia Railways," who found that "the level of charge tends to be governed by the value of the service to the user rather than by the cost of the service to the provider." (Chapter II paragraph 27 page 5) ... "The Commission recognises as correct procedure the study of costs as a guide in the practice of rate-making" (Chapter II, page 9 paragraph 57).

(Cf. G.W. Wilson, Essays on some unsettled questions in the economics of transportation, Indiana University 1962, page 31.)

The Railways can pride themselves that they have already advanced with great strides towards a good costing system. As will be pointed out in paragraph 4.2., however, the costing system employed is not considered adequate in terms of the nature of their production process, since they do not know what it costs to transport a given weight over a given distance in respect of particular goods or categories of goods.

From a cost control point of view the "responsibility accounting" system which is enforced in the Railways can only be a step in the right direction. This system provides the essential cost control which is associated with the formal organizational structure of the Railways.

"Responsibility accounting is an integral part of the delegation of authority referred to in the previous paragraph, for it involves staff down to supervisory level in the preparation of budgets and the setting of working standards, and thereafter keeps them informed each month as to how actual performance compares with the budgets and standards agreed." - (15th Annual Report for the year ended 30th June 1964 - Rhodesia Railways).

The most important single step in the direction of costing the transportation of different types of goods over given distances is a special cost exercise which was carried out by the Railways. Although costs provided in this exercise were in respect of the various intermediate outputs relative to the transportation operations, costs were still not related to specific goods.

These intermediate outputs referred to above are the conventional units of output used by railways, viz., engine miles, wagon miles, truck journeys, etc.

This cost exercise covered the year ended 30th June, 1965 and resulted in an internal Railways cost publication entitled:-

"Reconciliation of operating costs exercise with the final accounts for the year ended 30th June, 1965."

Due to the confidential nature of this internal report details relative to actual costs cannot be given. From the details provided in the report, however, it was comparatively easy to calculate the average variable cost per ton-mile as well as the fixed cost per ton for the transportation of the average ton of goods. (Refer the average break-even calculation in Chapter 7 page 112).

A basic feature of this cost report is that all costs were average costs which ultimately could be related to the average ton of goods carried over a given distance. The average cost per ton-mile was, therefore, determinable. The disadvantage of the report, however, is that the cost of transporting particular goods could not be determined.

The question which still remains, therefore, is how the cost of transportation can be determined for different categories of goods.

Before attempting to answer this question, however, it is necessary to consider the purpose of cost and cost price analysis.

4.2. The purpose of cost and cost price analysis:

Cost determination and cost price analysis result in essential objective and basic information which is required by the management of any organisation in respect of sales price determination, efficiency control, policy formulation and policy decision. The effects of the lack of knowledge regarding costs and the introduction of inadequate costing techniques and systems can have serious consequences for an organization.

A.J.E. Sorgdrager (Kosprysberekening en tegniek, Potchefstroom 1967, Nasou Beperk, page 49) expresses the following views in this connection:-

"Die gebrek aan behoorlike kostekennis en die instelling van ondoeltreffende en ondoelmatige kosteberekeningstelsels wat nie by die aard van die produksie-proses aangepas is nie, kan aanleiding tot foutiewe kospryse gee. Dit bring verkeerde beleidsbeslissings en verkeerde beleggingsbeleid teweeg. Daardeur kom 'n ondoelmatige ondernemingspolitiek tot stand met 'n moontlike prysbederf, as gevolg van 'n verkeerde kalkulasie van die koste."

If the cost approach employed by the Railways is subjected to Sorgdrager's requirements of an adequate costing system, it is notable that the downfall of their costing system is specifically as regards the point mentioned in respect of the adaptation of the costing system to the nature of the production process (".... nie by die aard van die produksie proses aangepas is nie.")

This situation could be rectified by adapting the costing system to the nature of their "production process." Since the "production process" provided by the Railways is the transporting of different categories of goods over various distances, it should be evident that the costing system employed should be in terms of these goods transported.

In relation to the requirements of the proposed transportation policy for Rhodesia, the purpose of cost and cost price analysis can be defined as follows:-

To determine as accurately as possible the costs of transporting different goods, or categories of goods over given distances in respect of alternative means of transport in order to establish competitive tariffs which would ensure that fair competition exists between the alternative media.

The determination of the costs described above would result in transportation price determination and in addition would serve as the fundamental basis for efficient control, policy formulation and policy decisions.

Since the Railways and road transport compete on common ground, both these media should be subjected to continuous cost determination and cost price analysis. The reason for this is basically that timely action could then be taken as regards the adjustment of tariffs to reflect any basic changes in the transportation cost structure. In addition remedial action could also be taken in respect of any inefficiencies in the operational aspects of the alternative transportation media.

(An approach to the cost determination of road transportation is dealt with in chapter 5.)

4.3. Unit of output and cost definitions:

The establishment of an adequate transportation cost price analysis framework presupposes that the various cost categories used in the analysis have been subjected to proper definitions. Cognisance should also be taken of the "unit of output" of the transport media and the nature of the various costs involved.

G.W. Wilson comments as follows in - Essays on unsettled questions in the economics of transportation - page 13, Indiana University 1962:-

"The implications of this are clear:

1. to preserve inherent advantages, freight rates for each medium must reflect or equal costs, and
2. freedom of shipper choice is essential in view of the heterogeneity of shipper circumstances. There is certainly nothing original about this. Indeed cost-based pricing and rate making have long been advocated as the only way to achieve optimum allocation. But it is precisely at this point that some of the crucial and as yet unresolved difficulties emerge. First, since inherent advantages refer to relative economic costs vis-à-vis quality of the output of transportation facilities, we need some clear-cut concept of the unit of output. Second, while it is clear that a cost-based rate structure is required, there is a substantial disagreement over whether the cost involved should refer to marginal or fully allocated cost."

4.3.1. Unit of output:

The basic function of any goods transportation system is to bridge the gap between producers and consumers. Goods of a certain weight have to be moved over a certain distance. In terms of the function of transportation the ton-mile as unit of output seems appropriate. From the demand point of view it would seem logical to quote the tariffs charged in terms of ton-miles.

Since it is the unit of output which is determined it is logical that whatever costing system is employed it should be related to the output unit.

(Cf. G.V. Wilson, (op. cit., pages 14 to 20)
who comes to the conclusion that "the ton-mile is the most appropriate unit, especially with reference to all forms of transport.")

4.3.2. Cost definitions:

The cost of transportation forms the basic criterion on which tariffs should be based. Without detailed costs the ultimate objective cannot be met. The question which arises is what are costs? A clear-cut definition, therefore, has to be provided of the costs which should be used for tariff determination.

"Yet, despite the overriding significance of costs and the amount of attention they have received, there remains a considerable amount of confusion and difference of opinion with respect to definitions of important cost categories, ..."
(G.V. Wilson, op. cit., page 31.)

A distinction can be made between the following types of costs all of which are present in the cost structure of the transportation operations of the Railways:-

1. Fixed costs:

Fixed costs are those costs which are fixed for a period of time and which do not fluctuate in response to decreases or increases in the volume of output within that period of time.

Per unit of output, fixed costs would decrease if an increase were experienced in the volume of output, and vice versa.

Fixed costs per unit of output can be presented mathematically as follows:-

$$C = \frac{F}{N}$$

where C = Fixed cost per unit of output

F = Total fixed cost

and N = The number of output units.

(Refer Annexure 5 page A54 for a graphic illustration of the behaviour of fixed costs with increases in the volume of output)

(Cf. H.J. van der Schroeff, *Kosten en Kostprijs*, Kosmos, Amsterdam 1965, pages 316 to 330;

H. Kürpick, *Die Lehre von den fixen Kosten*, Westdeutscher Verlag., Köln und Opladen 1965.)

2. Variable costs:

Variable costs are those costs which vary in a 'more or less' direct ratio to changes in the volume of output. Per unit of output, these costs can be considered to be relatively fixed.

The mathematical notation for variable costs is:

$$Y = NX$$

Where Y = total variable cost

$\bar{X}$ = average variable cost per unit of output

N = number of output units produced

(Refer Annexure 5 page A55 for a graphic illustration of variable cost behaviour with increases in output).

It should be noted that in the above definition emphasis was placed on the words 'more or less' direct ratio. The reason for this is that variable costs could have a progressive or a digressive nature depending on the extent of the utilization of given production facilities. For example, if an imperfect balance existed between the transportation of goods in both directions between two centres, a certain inherent and unavoidable 'empty running' of rail trucks would be present. An increase of goods transportation in the 'unloaded direction' would result in a decrease of the average variable costs, whilst an increase in the 'loaded direction' or a decrease in the 'unloaded direction' would result in an increase in the average variable transportation cost.

((Cf. H.J. van der Schroeffer - op. cit., pages 345 to 355,

A.J.E. Sorgdrager - op. cit., pages 232 to 234.)

3. Semi-variable costs:

Semi-variable costs can be defined as those costs which vary in time in a discontinuous ratio to increases or decreases in volume. A constant cost to output volume ratio does not exist, although the cost tends to move in steps in harmony with output. Semi-variable costs can also be considered as delayed variable costs.

For example: An output of 11 to 20 units could result in a cost of £X, whilst 21 to 30 units could result in a cost of £(X + 1) and 31 - 40 units could result in a cost of £(X + 2).

(Refer Annexure 5 page A56 for a graphic illustration of semi-variable cost behaviour with increases in output).

(Cf. A.J.E. Sorgdrager, op. cit., page 229 paragraph 3.

Various methods can be employed in separating costs into variable and fixed cost categories. A number of these methods are described in pages 340 to 343 in Cost accounting for management, by W.A. Terrill and A.W. Patrick, Publishers: Holt, Rinehart and Winston Inc., New York 1965.

4.4. What constitutes costs?

All costs are the product of two variables, namely, a scarce resources volume on the one hand and the value per unit of these scarce resources on the other.

Mathematically this can simply be stated in the following equation:

$$X = \bar{P} \cdot \bar{Q}$$

where X = Cost

$\bar{P}$ = Average price per unit of the scarce resource.

and

$\bar{Q}$ = The average quantity of scarce resources required for a given output.

Normally the total cost of any output is the result of the combined use of any number of scarce resources, each with its own value per unit.

Interest on capital is not considered as an independent cost, since a causal relationship exists between it and other cost types.

((Cf. A.J.E. Sorgdrager, op. cit., page 54 to 57.)

The cost equation can, therefore, be formulated as follows:-

$$X = \bar{P}_1 \cdot \bar{Q}_1 + \bar{P}_2 \cdot \bar{Q}_2 + \dots + \bar{P}_n \cdot \bar{Q}_n$$

Where X = Total cost of output

$\bar{P}$ = Average price per unit of scarce resources
(1 - n)

$\bar{Q}$ = Average volume of scarce resource units
(1 - n)

4.4.1. The function of the price per unit of scarce resources in the cost equation:

Without the price per unit of scarce resources it would be impossible to obtain a surveyable insight into the combined economic effects of the use of the various scarce resources in obtaining a desired output. The price per unit, therefore, is essential for establishing an overall measurement of the cost relative to the use of the various scarce resources and has a natural tendency to remain relatively fixed within a given period of time e.g.

- a. The wage rate per hour/per day of the artisan is fixed by an agreement for a given period.
- b. The purchase price of a specific material is fixed by mutual agreement or contract before the article is in fact purchased, etc. etc.

If the price per unit of a given scarce resource is considered fixed, be it labour or material, etc., control can be achieved by controlling the volume of the scarce resources used. A cost control system should make provision for the effects of changes in the value per unit of various scarce resources.

It should be noted that changing price levels as reflected in the unit costs of scarce resources could have a marked effect not only on the relative accuracy with which costs can be determined, but also as regards comparisons between costs in different periods. An index system, however, could be employed where, irrespective of the time periods which are compared, unit costs could be equalised or fixed on base year price levels

(Cf. R.S. Gynther, Accounting for price-level changes:- ~~Theory~~ and ~~Procedures~~, Oxford Pergamon 1966)

4.4.2. The effects of the use of different volumes of scarce resources:

In developing a sound costing system the basic aim should be to eliminate or separate the effects of variations in the price per unit of the scarce resources required to achieve the desired output. The price per unit could then be considered a fixed rate or a constant.

Having achieved this cost control in effect becomes a "quantitative control" of the volume of scarce resources (at fixed prices) used to achieve a given output. The more efficient the use of these scarce resources the lower the resulting cost will be.

The use of the volume of scarce resources defined as Q_1 to Q_n in the above cost equation, however, cannot be controlled in total, since the addition of Q_1 to Q_2 to Q_3 etc., would result in a meaningless volume. The use of fixed prices per unit provides an excellent measure of the quantitative use of scarce resources.

Effective individual quantitative control can be achieved if a standard is created against which the use of the scarce resource volumes can be compared for given outputs.

4.4.3. The creation of standards in respect of the use of scarce resource volumes in the Railways:

It is fully realized that a multitude of different scarce resources are used in the operations of the Railways to produce a multitude of intermediate outputs. Examples of these are:-

- a. the volume of coal used by a locomotive in hauling a train load over different distances in accordance with scheduled times;
- b. the use of manpower of different types e.g. conductors, drivers, firemen etc., who are directly associated with the running of the train over different distances according to scheduled times;
- c. the size of gangs of labourers required to maintain a rail track of a given distance;
- d. the number of terminal staff required to handle a given tonnage during a specified time;
- e. the capacity of loading and off-loading equipment required to handle a given tonnage during a given time;
- f. the number of head office staff needed to efficiently record and analyse information required to control and co-ordinate operations; etc.

In creating standards in respect of the use of various scarce resource volumes it should be evident that these standards could only be established effectively if studies were undertaken on a micro-basis in respect of each of the diversified operations in relation to given outputs. These standards could be based on average performances of the scarce resources used in the production of given outputs. From a costing point of view these averages could be considered adequate, but from a management control point of view a basic interest should be displayed in the variations which occur in the use of the scarce resources.

(Cf. H.J. van der Schroeffer, op. cit., pages 60 to 72;

W.A. Terrill and A.W. Patrick, Cost accounting for management, Holt, Rinehart and Winston Inc. New York 1965, pages 344 to 347).

Standards in respect of performances should not be seen as fixed. Technological changes and the introduction of methods which would promote a more efficient use of scarce resources would result in a changing of standards.

The setting of standards and appropriate tolerance limits for these standards within which the variability of performance can be regarded as normal, would allow management to take corrective action should any waste occur in the use of the scarce resources. This technique is commonly used in statistical quality control procedures.

(Cf. G.B. Carson (editor), Production handbook, 2nd edition. Ronald Press, New York, Section 8.)

4.5. Principal criterion on which the determination of variable costs of different categories of goods is based:

Here the purpose is to establish a principal criterion which could be used to determine the differences in variable transportation costs of various goods or categories of goods over given distances in an effort to move away from the average variable cost of transportation per ton-mile and to work towards a more representative cost of transporting different categories of goods by rail.

What is basically sought is to establish a cost range around the average cost. This cost range results from an inherent heterogeneity which is present in the various goods or categories of goods which are transported.

This inherent heterogeneity can basically be ascribed to the different relationships which exist between weight and volume, i.e. the density of various goods. The density of goods forms the principal criterion on which the determination of variable costs of different categories of goods is based.

4.5.1. Density, or the relationship between product weight and volume, and its use in determining the variable transportation cost range:

The various products requiring transportation differ in densities. In relation to the availability of transportation capacity the basic limitation is the weight factor which is imposed by the technological ability of rail trucks and locomotion power used. Due to safety and other factors secondary limitations can also be imposed on the volume of goods carried.

The various goods should be subjected to two loading limitations, viz., a weight or tonnage limitation and a volume limitation, whichever is reached first. Different goods, therefore, could yield different tonnages in the same transportation capacity if subjected to the weight and volume limitations.

If it is assumed that the variable cost of transportation were established in respect of the truck for given circumstances, the only basis on which these costs could be allocated would be on their weight/volume relationship. The cost per ton must, therefore, vary inversely with the density of goods transported.

(Refer to the graphic illustration in Annexure 5 page A57 for the influence of the density of the goods transported on the cost of transportation per ton of goods).

Studies relative to the densities of different goods would have to be undertaken by the Railways.

The table in Annexure 10 page A96 provides a detailed breakdown of goods transported by the Railways for the year ended 1965. The only goods which would cause any real problem would be the "General Goods" category which represent 3,811,806 tons or about 30% of a total of 12,950,479 tons transported on behalf of rail transport users. The densities of other goods carried such as cement, maize and maize meal, petrol, oil and lubricants, raw sugar, tobacco, coal, coke and all other minerals are readily determinable.

The outcome of these density studies would be to rank the various categories of goods into distinct density categories. Each of these categories would result in a different truck tonnage capacity utilization, subject to the imposed volume restriction.

As an illustration the following hypothetical density categories expressed in terms of the weight capacity percentage utilization of rail trucks have been established.

TABLE INDICATING WEIGHT CAPACITY PERCENTAGE
UTILIZATION OF VARIOUS GOODS DENSITY CATEGORIES:

Goods density categories	Weight capacity % utilization	Rating	Remarks
D1	0 - 10	10	Low density
D2	11 - 20	20	
D3	21 - 30	30	
D4	31 - 40	40	
D5	41 - 50	50	
D6	51 - 60	60	
D7	61 - 70	70	
D8	71 - 80	80	
D9	81 - 90	90	
D10	91 - 100	100	High density

Once density categories have been established the question which arises is now these categories could be used to determine a range around an average variable cost of transportation.

If it is assumed that the average variable cost of transporting a full rail-truck of a given weight capacity over a given distance is determined, the cost per ton of transporting goods in various density categories could be calculated by using the following equation:-

$$/Y =$$

$$Y = \frac{X}{C} \times \frac{100}{R}$$

Y = Cost per ton for goods in any goods density category

X = Average variable cost of transporting the given rail-truck over a given distance (say 1 mile).

C = Capacity of the rail truck.

R = The weight capacity utilization factor of the goods density category.

On page 50 a table is provided in respect of a hypothetical case relating to a cost of £10 to transport a truck with a weight capacity of 20 tons over a given distance. This table indicates what the transportation cost per ton would be in respect of each of the goods density categories.

The table also provides an indication of the tonnage in respect of each of the goods categories which could be loaded so as not to exceed the volume limitations imposed on the goods.

Full capacity loads (weight or volume) would yield the same cost as regards the transportation of the truck, irrespective of which categories of goods were transported.

Table giving example of hypothetical transportation costs for various categories of goods:

Transportation cost per truck = £10.
Capacity of truck = 20 tons.
Distance covered = n miles.

Goods density categories	Weight utilization factor	Cost per ton	Total truck cost	Maximum 1) truck load in tons
D1	10	£5	£10	2
D2	20	£2.5	£10	4
D3	30	£1.667	£10	6
D4	40	£1.25	£10	8
D5	50	£1.00	£10	10
D6	60	£0.833	£10	12
D7	70	£0.714	£10	14
D8	80	£0.625	£10	16
D9	90	£0.555	£10	18
D10	100	£0.5	£10	20

- 1) The maximum truck load per goods density category is calculated by using the following formula:

$$V = \frac{\text{Total truck cost}}{\text{Cost per ton}}$$

(Cf. E.C. Poole, op. cit., pages 96 and 97).

4.5.2. Development of a cost index based on density:

A study of the hypothetical transportation cost exercise reveals that the ratio between the "weight utilization factor" of any two goods density categories is directly inverse to the ratio between the respective costs per ton for the same two categories. This is illustrated by the examples in the table below:

Table indicating weight utilization and cost per ton ratios between different goods density categories:

Goods density categories	Weight utilization factor ratio	Cost per ton ratio
D1 : D2	$\frac{10}{20} = \frac{1}{2}$	$\frac{5.0}{2.5} = \frac{2}{1}$
D1 : D4	$\frac{10}{40} = \frac{1}{4}$	$\frac{5.0}{1.25} = \frac{4}{1}$
D4 : D8	$\frac{40}{80} = \frac{1}{2}$	$\frac{1.25}{.625} = \frac{2}{1}$
D1 : D10	$\frac{10}{100} = \frac{1}{10}$	$\frac{5.0}{0.5} = \frac{10}{1}$

This relationship between densities (and, therefore, transportation costs) could be used to establish a cost/density index which in turn could be used for the determination of transportation costs of various categories of goods. The cost/density index is illustrated in the following table:-

Table indicating cost/density index for various goods density categories:

Goods density category	Weight utilization factor	Ratio *	=	Cost/density index
D1	10	$\frac{100}{10}$	=	10
D2	20	$\frac{100}{20}$	=	5
D3	30	$\frac{100}{30}$	=	3.33
D4	40	$\frac{100}{40}$	=	2.5
D5	50	$\frac{100}{50}$	=	2.0
D6	60	$\frac{100}{60}$	=	1.67
D7	70	$\frac{100}{70}$	=	1.43
D8	80	$\frac{100}{80}$	=	1.25

Table continued on next page.

Table continued:

Goods density category	Weight utilization factor	Ratio *	=	Cost/density index
D9	90	$\frac{100}{90}$	=	1.11
D10	100 (Maximum)	$\frac{100}{100}$	=	1.00

*
$$\text{Ratio} = \frac{\text{maximum weight utilization factor}}{\text{relative weight utilization factor}}$$

In the same manner a cost index could be calculated for all weight utilization factors between say 1 and 100.

Given the variable transportation cost of say 1 ton of goods with a cost/density index of "1", the transportation cost of any other goods could easily be determined if their weight utilization factor and, therefore, their cost/density index were known.

The calculations involved could be done according to the following formula:-

$$Y = X.I.$$

where Y = Variable transportation cost of transporting 1 ton of specific goods over a distance of 1 mile.

X = Variable transportation cost of transporting 1 ton of goods with a cost/density index of "1" over a distance of 1 mile.

I = The cost/density index relative to the specific goods requiring transport.

Example:

$$X = \text{£}1.10.0\text{d.}$$

$$I = 1.25$$

$$Y = X.I.$$

$$= \text{£}1.5 \times 1.25$$

$$= \text{£}1.875$$

$$= \text{£}1.17.6\text{d.}$$

4.5.3. Grouping of cost/density index values:

For the sake of convenience it is proposed that in practice use be made of a limited number of cost/density index value groups, each represented by a single index value.

The following factors should be considered before attempting to group cost/density index values:-

1. The practical weight utilization factor range which will be present. Density studies might, for example, reveal that the smallest weight utilization factor involved could be, say, the factor 30. This factor 30 would then serve as the practical cut-off point on the cost/density index value graph. (Refer Annexure 5 page A57)
2. The groupings should be based on changes in the cost/density index values and not on changes in the weight utilization factors. The reason for this is that if the groups were based on weight utilization factors it would result in increasing group sizes as regards cost/density index values. (Refer Annexure 5 page A58).
3. The index value chosen to represent the cost/density index value group could be based on any of the following:-
 - a. The lowest index value in the group. This value can easily be determined and is the most conservative value which could be taken.
 - b. The index value applicable to the average weight utilization factor of the total tonnages of goods subject to transport within the relative weight utilization group. This approach would involve a considerable amount of detailed calculations based on statistical information relative to the actual tonnage transportation of goods in the different density categories.
 - c. The middle value of each cost density value group. This value can easily be determined.

For the purpose of illustrating the use of a single index value. the following table is based on middle values of index groups. It should be noted that any of the other index values set out above could have been adopted as index values.

Table indicating cost/density groups, chosen index values and weight utilization factor ranges:

Cost density category	Cost/density index value group	Chosen cost/density group index value (Based on middle values)	Weight utilization factor range
D1	1 to 1.4	1.2	± 29 to ± 33
D2	1.4 to 1.8	1.6	" 33 to " 38
D3	1.8 to 2.2	2.0	" 38 to " 44
D4	2.2 to 2.6	2.4	" 44 to " 55
D5	2.6 to 3.0	2.8	" 55 to " 72
D6	3.0 to 3.4	3.2	" 72 to " 100

(For the determination of the "cost/density index value groups" and "weight utilization factor ranges" refer to Annexure 5 page A58)

4.5.4. Application of the chosen cost/density group index values to variable transportation costs:

A warning should be given here as regards the use of the cost/density group index values when applied to variable transportation costs. The index value should be applied only to a cost per ton-mile which is derived from the maximum potential weight utilization of the average or given railway truck or trainload. The factor should not be applied to an average variable cost of transportation per ton-mile which disregards the utilization of truck capacities, since only higher than average cost would then result.

Due consideration should also be given to variable costs associated with the running of empty trucks. Where possible the variable cost of empty running should be allocated to goods or categories of goods which are responsible for having caused the empty running.

(Cf. G.W. Wilson, op. cit. page 76 to 78.)

If the above approach were used, it would be possible to move away from an average variable cost of rail transportation per ton-mile. The use of cost/density index values would result in a range of variable costs around the average which would be more representative of the cost of transporting particular categories of goods.

4.6. The determination of fixed terminal costs per ton based on differences between products and between types of traffic:

4.6.1. Factors influencing terminal costs:

Different product categories or different types of traffic will result in different terminal costs for each of the goods categories.

Factors which could have an influence on the terminal costs of goods traffic are -

- a. The size of the consignment and the characteristics of the goods subject to transportation, and
- b. The destination of the goods consignments.

4.6.1.1. The size of goods consignments:

The size of goods consignments could vary between full train loads through truck loads to an assortment of goods in the same truck. Together with the characteristics of goods subject to transportation this could be responsible for a significant variation in the fixed terminal costs.

Costs (on a per ton basis) relative to the documentation associated with the transportation of goods would, for example, be higher for a large number of small consignments which are transported in a single rail truck, than those of a single consignment taking up a full truck load.

Handling costs on the other hand could differ significantly between products as a result of the characteristics of the product. Coal, for example, could be dumped mechanically by the producer at his own cost in large quantities into trucks, whereas other small consignments, for example, might have to be sorted to destination, temporarily stored and loaded and covered under tarpauliers by the Railways.

4.6.1.2. The destination of consignments:

In addition to size the destination of a consignment could also play an important role in the determination of the level of the fixed terminal costs per ton of goods transported.

Full train loads between two stations, for example, would require less shunting operations than an assortment of truck loads which were destined for different stations.

(Cf. M. Beckmann, C.B. McGuire and
C.B. Winsten op. cit., pages 127 to 163).

4.7. Different levels of terminal costs:

In order to establish different levels of fixed costs for different categories of goods the basic pre-requisite which would have to be met is that the different types of terminal costs would have to be subjected to a functional break-down. The Railways, for example, at present use the following break-down:-

- i. Shunting and yard costs;
- ii. Traffic costs, i.e. those costs related to the documentation associated with the transportation of goods, and
- iii. Handling costs.

4.7.1. Shunting and yard costs:

It would be necessary to conduct special studies in respect of different types of traffic to establish the relative share of each type of traffic of the total shunting and yard costs. Shunting and yard costs could conveniently be classified into two distinct categories, viz., train loads where shunting and yard costs are at a lower than average cost level and truck-loads where the cost level could be higher than the average cost. The basic reason for recommending only two cost levels would be to effect a basic break-down of railway shunting and yard costs which would be comparable with road terminal costs.

Since the greatest competitive threat to the Railways from road hauliers is the result of the high cost of terminal operations which are associated with the shunting and yard costs of the Railways, it seems logical that an average cost should not be taken as being representative of these railway operations, but that a differentiated rate should be determined.

All that would essentially be required in these special studies would be to determine the shunting and yard costs associated with train load consignments or with that type of traffic which occurs least frequently. These studies could be undertaken on a sample basis. Costs such as shunting engine costs, shunting services undertaken by neighbouring railways (C.F.N. and C.F.M.B.) and costs of yardmasters, shunters and number-takers would need to be determined. These costs are all functions of time, viz., engine hours or man-hours. Use could, therefore, be made of time-study techniques.

(Cf. G.B. Carson (editor), Production handbook. 2nd edition, Ronald Press, New York 1959 Section 8.)

It should be noted that these costs should firstly be related to the total number of rail truck journeys involved, irrespective of capacity utilization achieved. The question, however, which still remains is how a cost per ton of goods can be calculated. Possible approaches are illustrated with the aid of the following hypothetical example:-

Example: Assume that a carrying capacity of X tons per full truck has been established for a particular type of traffic (train loads or truck loads) and that the total costs of all the trucks used for this traffic have been established at £Y. The cost per ton for full trucks would then be:

$$\frac{\text{£Y}}{\text{NX}}$$

Where N = the number of truck journeys.

In practice, however, say only 60% of the available capacity would have been utilized, thus resulting in a cost per ton of

$$\begin{array}{r} \text{£ Y} \\ \hline \frac{60}{100} \text{ N.X.} \end{array}$$

This cost per ton moved would be greater than the cost per ton based on the full truck loads.

The under-utilization of rail trucks could be due to any of the following causes:-

- a. The inherent densities of the particular goods involved. (Refer also paragraph 4.5.1. of this chapter.)
- b. The imposed under-utilization of rail trucks due to absolute empty running which could be caused by a non-balance in the transportation of goods between given centres.
- c. Low capacity utilization which could have been avoided, etc.

In practice total terminal costs plus all running costs should be recovered from total receipts. In order to achieve this it would seem essential that terminal cost determination in respect of shunting and yard operations should take cognisance of the inherent densities of the goods subject to transportation. As regards the imposed under-utilization of trucks, one of two approaches could be adopted. Terminal costs relative to empty running could be distributed equally to all tonnages transported, or else, should it be possible to establish which particular goods could be held responsible for the empty running of trucks, then the costs involved could be loaded on to these goods.

(Cf. G.W. Wilson, (op. cit., pages 76 and 77) on the question of joint costs relative to balanced movements.

A.J.E. Sorgdrager, op. cit., pages 256 to 260.)

Where low capacity utilization could have been avoided, it is felt that the "cost" which could be associated with that low utilization should not form a part of the calculated cost per ton, since it should be regarded as an unproductive cost. This unproductive cost should not be included in any cost which is used for tariff determination.

(Cf. A.J.E. Sorgdrager, (op. cit., page 50 to 52) for a discussion of productive and unproductive costs and their relation to profit and loss.

H.J. van der Schroeffer, op. cit., pages 26 to 33.)

4.7.2. Traffic costs:

Traffic costs include all those costs which could be related to the documentation associated with the transportation of goods. The unit of output in respect of traffic costs is the number of consignment and advice notes prepared. These notes are not a function of the weight of goods transported. A consignment of 100 lbs, for example, could require the preparation of the same amount of documentation as consignments of 10 tons and 30 tons. A fixed rate per ton of goods, therefore, seems illogical. A fixed charge per consignment should be established which would not be included in the tariffs, but which could be considered as an "added charge."

Provision could be made in this charge for extra documentation which could arise as a result of single consignments which exceed single rail truck loads.

4.7.3. Handling costs:

A clear-cut distinction should be made between the different types of goods traffic which require handling at terminals. Initially one handling rate could be established, viz., a fixed handling rate per ton of goods handled. This rate would be an average rate. Detailed studies which could follow in time, would allow a breakdown of this average rate into various rates for specific categories of goods requiring different handling facilities.

There would of course be no handling rate for goods not handled by the Railways. These goods could be all the bulky goods such as minerals etc. which are handled by the producers of the goods.

4.8. Conclusions:

By using the approaches outlined in this chapter to determine variable and fixed costs in respect of different categories of goods it would be possible to determine the variable costs of transporting different categories of goods over different distances. Instead of having to work with a single average variable cost for the Railways as a whole, this approach would result in deviations from the average which are caused by the inherent nature and characteristics of the goods subject to transportation.

Different levels of terminal costs could also be determined. The characteristics of the goods transported, together with the size of the consignment and the nature of the traffic, play a significant part in the various levels of terminal costs which could be determined.

The approach outlined would result in a higher than average cost for low density goods in respect of both fixed and variable costs. Small consignments of goods should also show higher than average costs, specifically as regards traffic costs. The reverse situation, i.e. high density goods and large consignments, would result in lower than average costs.

(Refer Annexure 5 page A59 for a graphic illustration of hypothetical fixed and variable costs for different categories of goods.)

This cost differentiation could result in realistic tariffs which would be based on and which would reflect costs as regards railway transportation operations. These costs would also form the basis on which rail transportation costs could be compared with those of the road transportation of goods. A comparison of the costs of alternative means of transportation would be indicative of the economic use of the scarce resources which are available to the alternative transportation media.

Having established an approach to costing rail transportation operations on a goods or category of goods basis, it is necessary to develop a costing approach which could be applied to the road transportation of goods. Consideration must also be given to cost comparisons of alternative transportation media in transporting specific goods or categories of goods.

CHAPTER 5

AN APPROACH TO ROAD TRANSPORTATION COSTING AND COST COMPARISONS BETWEEN RAIL AND ROAD

5.1. Introduction:

The objective of this chapter is primarily to develop an approach which could be used to determine the cost of road transportation of goods, or different categories of goods. Road transportation cost studies should essentially be confined to those road transport operators who are directly in competition with the Railways. A secondary objective is to provide an outline of a technique which could be employed to compare the transportation costs relative to specific goods of the alternative transportation media, viz., rail and road.

5.2. Road transportation costs:

5.2.1. Information requirements and use:

The function of processing cost information relative to the road transportation industry. could be the responsibility of the transportation research economist, who's appointment was proposed in chapter 2 of this study.

The approach which is outlined in this chapter could be adopted by the transportation research economist to obtain transportation cost information for the various road transporters in Rhodesia. The costing system could also be used by individual road transportation firms although the emphasis in this study is on the use of the collective cost information obtained from the road transportation industry as a whole.

The cost associated with the collection of this information should be considered and it is proposed that cost information should not be collected from all road transport operators. It would seem adequate if only a limited number of efficient operators were selected to provide the required cost details. These operators would generally be the larger operators who in any event do control the bulk of the road transportation industry's capacities.

(Refer Annexure 6 page A76)

How often road transportation costs are collected would also influence the cost of collecting the required information. It is proposed that cost information be collected on a six monthly basis only. The information could be collected by the Central Statistical Office, in Salisbury. The provision of the information should be made compulsory. The costing records of the firms supplying the information should be open to inspection and verification by either the Central Statistical Office or the transportation research economist.

The basic use of road transportation cost information would be to promote the functions of planning, control and co-ordination in the transportation industry (See chapter 2).

A few other possible uses to which this information could be put, are the following:-

- i. Cost comparisons could be effected between various transportation competitors, e.g. long-distance Public Service Road Hauliers and the Railways, the Railways road motor services and Public Service Hauliers, Public Service Hauliers and other road competitors including farmer syndicates, commerce and industry, etc.
 - ii. Costs could be used to form the basis for establishing uniform tariffs for the road haulage industry.
- (Refer chapter 3 page 22)
- iii. The publication of collective costs of the road transportation industry would enable individual transportation firms to judge the performance of their particular organization in relation to that of the industry. The published information could, therefore, act as a stimulant for increased efficiency within the industry, etc.

(Cf. G.W. Briggs, (Road haulage management, Second edition, Butterworths, London 1965, pages 159 to 161), with particular reference to information requirements and the need for costing in individual road transportation firms.)

5.2.2. The development of a collective costing system for the road transportation industry:

5.2.2.1. Factors responsible for cost variations:

In developing a collective costing system it is important that cognisance be taken of the following factors which could be responsible for possible variations not only in the costs of various road transportation operators but also in the costs of various vehicles (even in the same class) owned by a particular transportation firm:-

- a. The characteristics of the road transportation vehicles which are employed.
- b. The influence of the standards of the roads over which these vehicles are used to transport goods.

(Cf. R.S. Millard and R.S.P. Bonney, The cost of operating buses and trucks on roads with different surfaces in Africa, Reprinted from Road International No. 57, June, 1965. The purpose of this paper published by Millard and Bonney was "to illustrate a use for data on the effects of road surfaces on the operating costs of vehicles.")

- c. The basic nature of the transport operations, e.g. whether the vehicles are used for relatively short runs or for long distance transportation.
- d. The size of the firms engaged in the transportation of goods, etc.

5.2.2.2. Detailed cost requirements:

There are two possible approaches to the collection of detailed costs from the various transportation firms. The one is the collection of actual costs incurred which for any cost item is the product of the quantity of the scarce resources used and the price paid per unit, (see chapter 4 paragraph 4.4.1.) and the other, the collection of quantitative information relative to the use of scarce resources.

The collection of quantitative information would have the advantage that costs could be calculated using a standard price per unit which would be applicable to all transport operators. Another advantage of this system would be that certain road transport operators would not be penalized or favoured by high or low price levels which were imposed on them.

At present Rhodesian farmers are favoured by a 3d per gallon rebate on fuel and their wage structure bears no relation to that within the transportation industry. By disregarding differences in unit prices, road transporters would be afforded equal treatment which would be based on the performance and use of road vehicles.

A further advantage of collecting quantitative information is that changes which could occur in price-levels would be eliminated (see chapter 4 paragraph 4.4.1.). Costs could easily be calculated for present conditions, making use of current price-levels.

Maintenance costs, in particular, could provide a problem area specifically as regards the cost of spares used. Actual costs should be used in this instance. Price-level adjustments could be made by employing a price-index (see chapter 4 paragraph 4.4.1.).

Detailed information should be collected from selected road transport operators. The information required should not be supplied in respect of individual vehicles, but should be in a summarized form in respect of various vehicle groups or classes. The formation of vehicle groups should be a function of factors responsible for cost variations such as the type of fuel used, the type of roads on which the vehicles operate, the basic nature of the transport operations and the carrying capacities of the vehicles.

A certain group of vehicles, for example, would be those vehicles which use petrol, operate on gravel roads over short distances, with a carrying capacity of say between $7\frac{1}{2}$ and 10 tons. Further groups would be formed by varying the above factors.

The following is a list of information required from road transport operators:-

A. Vehicle groups:

Information should be supplied in respect of vehicle groups which result from combinations of the following variable factors:-

1. Fuel used:
 - a. Petrol
 - b. Diesel oil
2. Type of roads:
 - a. Bituminous surface
 - b. Improved gravel surface
 - c. Unimproved roads
3. Type of traffic:
 - a. Long distance haulage;
 - b. Short distance haulage;
4. Carrying capacity:
 - a. 1 to $2\frac{1}{2}$ tons
 - b. $2\frac{1}{2}$ to 5 tons
 - c. 5 to $7\frac{1}{2}$ tons
 - d. $7\frac{1}{2}$ to 10 tons
 - e. 10 to 15 tons
 - f. 15 to 20 tons
 - g. 20 tons and over

A classification which could possibly be considered is one which is also based on the axle configuration of vehicles. (Cf. R.S.P. Bonney and N.F. Stevens, Report on the investigation into vehicle operating costs in East and Central Africa - Part 1 Zambia, Unpublished report, Road Research Laboratory D.S.I.R. England 1965, page 12.)

B. Number of vehicles:

The number of vehicles in each vehicle group should be given. From this information the calculation of an average carrying capacity for each group would be possible (see also A.4 above.)

C. Variable costs - running and operating cost information:

Total variable cost information should be provided in respect of each vehicle group for the cost items given in the table below.

/Table

Table: Total variable costs:

Cost item description	Quantity used	Price per unit	Cost
i. Fuel usage (Petrol/ Diesel)	gallons	x	x
ii. Oil	pints/ gallons	x	x
iii. <u>Maintenance</u> :- Labour	hours	x	x
Materials/ Spares	-	-	x
iv. Tyres and tubes	set	x	x
v. Driver costs	hours	x	x
vi. Conductors/Other attendants costs	hours	x	x

As regards costs related to tyres and tubes, an estimate should be provided in respect of the life of these items. Costs for this item could then be calculated on a mileage basis.

The above variable cost information would have to be converted to costs per mile. The total number of miles travelled, therefore, would be required in order to establish the average operating and running cost per mile for the given groups of vehicles.

D. Depreciation costs:

The depreciation cost of a vehicle is a function of the original purchase price of the vehicle and a provision which is made for any increase in the replacement value of the vehicle. The depreciation of a vehicle furthermore depends on the age of the vehicle as well as on the utilization which has been obtained from the vehicle. A fixed depreciation amount per period of time plus a provision for increases in replacement costs is normally regarded as a fixed cost. Depreciation costs should be particularized on the basis of miles travelled by the vehicles.

(Cf. A.J.E. Sorgdrager, op. cit., pages 174 to 186).

E. Fixed Costs:

The following information should be obtained in respect of the fixed costs associated with the operation of vehicles:-

- i. total vehicle licence fees,
- ii. total Road Service Board permit fees,
- iii. total vehicles insurance fees.

F. Terminal costs:

An average terminal cost per ton handled should be provided by each firm of transporters.

Average fixed terminal cost per ton

$$= \frac{\text{Total terminal cost}}{\text{Total tons handled}}$$

G. Overheads:

Average overheads per ton handled should also be provided.

$$\text{Average overheads per ton} = \frac{\text{Total overheads}}{\text{Total tons handled}}$$

5.2.3. Use of cost information:

The above information could be used to calculate the variable cost per vehicle-mile, as well as the fixed cost per ton of goods handled.

The unit of output of the road transportation vehicle which is adopted is the ton-mile and average variable cost should be related to this output.

(Cf. M.R. Bonavia, The economics of transport, Nisbet and Co., Ltd., London 1941, page 94.)

The cost per ton-mile could readily be calculated by dividing the average variable cost per mile of each vehicle group by the average carrying capacity of that group. This cost per ton-mile which results from this calculation is based on a 100% capacity utilization of the vehicles. Since road motor goods vehicles are also subject to empty running, it is proposed that the cost per ton-mile should be inflated to reflect the costs associated with the imposed empty running of these vehicles. (Refer also chapter 4 paragraph 4.5.4.)

The question of densities would also have an influence on the variable cost per ton-mile. Since the approach outlined in chapter 4, in respect of the use of the relationship between product weight and volume to determine a variable cost range for different products equally applies to the road transportation, a re-consideration thereof is not necessary.

As regards the fixed cost per ton handled, it is proposed that use be made of a single average cost per ton.

It should be possible also to determine different levels of fixed cost per ton for the road transportation of goods. Studies could be undertaken on a sampling basis in order to establish whether it would be beneficial to move away from the average fixed cost per ton basis proposed and to introduce various levels of fixed costs.

Having established a framework for transportation cost-price determination for both rail and road, an approach has to be developed for comparing the cost of the alternative media.

5.3. Approach to cost comparisons between rail and road transportation:

The use of the cost break-even analysis technique is proposed for the purpose of comparing the costs of one transportation medium with those of another, and also for establishing rates for the alternative media, which would reflect their respective costs of transporting goods over given distances.

(Cf. S.A. Tucker, (op. cit., pages xiii to xv) for a description of a number of situations to which the break-even system can be applied by management to assist in their decision making activities).

Since the transportation of goods involves the transportation of given tonnages over given distances, the unit of measure to be adopted in effecting comparisons of the costs of the alternatives media is the ton-mile. (See also chapter 4 page 37

For the purpose of comparing the costs of alternative media in order to establish tariffs which will reflect these costs, the costs of the alternative transportation media should be seen from a long-term point of view, i.e. where all costs can be considered to be variable. The operations of the transportation suppliers can be grouped into two distinct sets of functions, viz., those functions which can be associated with the actual physical movement of goods between the supply and demand centres and those functions which can be associated with the terminal operations which take place before goods are actually moved.

The costs of the first functions can be considered as average variable costs in relation to the ton-miles which are involved in the transportation. The cost of the second set of functions can be considered average variable costs in terms of the tonnages handled. Irrespective of the length of the transportation journey involved, however, these latter costs remain fixed per ton of goods transported. For ease of identification these costs are considered as a "variable cost per ton-mile", and a "fixed terminal cost" per ton.

In terms of the above classification of transportation costs a cost break-even point calculation can be effected by the following formula:-

$$M = \frac{a - b}{x - y}$$

/where

- where
- M = The break-even point in terms of miles at which the total cost of alternative transportation media would be equal.
 - a = The fixed terminal cost per ton of transportation medium A.
 - b = The fixed terminal cost per ton for the alternative transportation medium B.
 - x = The variable cost of moving 1 ton over a distance of 1 mile by transportation medium B.
 - y = The variable cost of moving 1 ton over a distance of 1 mile by transportation medium A.

The above break-even formula is derived by equating the cost formulae of the alternative transportation media and solving for "m", as follows:

$$b + Mx = a + My$$

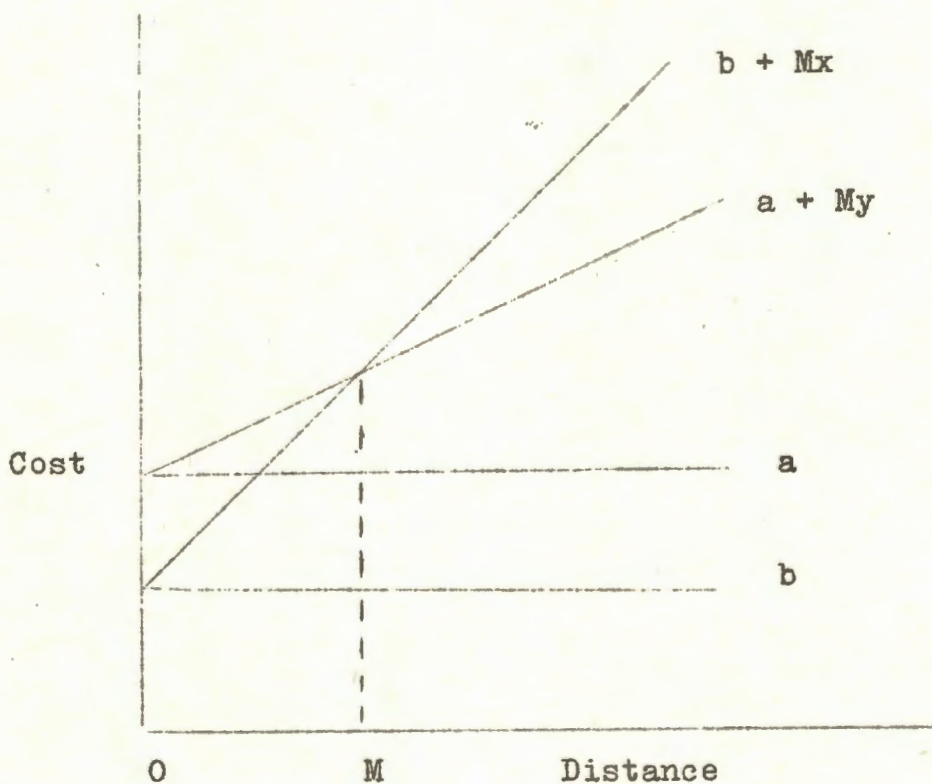
$$Mx - My = a - b$$

$$M(x - y) = a - b$$

$$M = \frac{a - b}{x - y}$$

Graphically the break-even analysis for the transportation of 1 ton of goods can be presented as follows:

Break-even graph:



The transportation medium A with a total cost function equal to $(a + My)$ would be more economical than the medium B with a cost function of $(b + Mx)$ for distances greater than M miles, and vice versa.

(Cf. A.J.E. Sorgdrager, op. cit., page 238 to 256.

D.T. Mahony, Purchasing techniques and inventory control for the small business, The Chartered Secretary, page 330, vol. 14, no. 12., also

L.F. Biagioni, A comparative study and evaluation of the accountants' and economists' concepts underlying the theory of marginal analysis, Unpublished thesis, Missouri, 1964, page 133 to 190, note the remark: "Break-even analysis as presented by the accountant (vis cost accountant) is an attempt to provide management with a practical tool that can be useful in forecasting profit alternatives-" (page 133).)

In the absence of actual transportation costs in respect of particular goods or categories of goods for both rail and road, this break-even technique is used as the basis for determining interim measures which are based on the use of the average transportation costs of goods by rail and road. (Refer chapter 7).

The above break-even analysis could be used for the purpose of establishing tariff rates for different categories of goods transported by either rail or road. These tariffs should reflect the respective transportation costs of the alternative transportation media and, therefore, should provide a break-even point at exactly the same distance as the cost break-even point. (Refer graph on page 27).

It should be noted that in determining tariffs provision must be made for a minimum rate which would cover the fixed terminal cost which is associated with the transportation of the goods concerned.

(Cf. Commission of Inquiry into the rating structure of the Rhodesia Railways, W. Harragin, chairman, Salisbury, pages 13 to 15).

CHAPTER 6

AN APPROACH TO A TRANSPORTATION INTELLIGENCE SYSTEM

6.1. Introduction:

In order to carry out effectively the functions relative to the planning, control and co-ordination of the operations of the competitors in the transportation industry, it is essential that factual transportation information be available to the Government. It is proposed that a "transportation intelligence system" be introduced for this purpose and that the transportation Research Economist be responsible for the maintenance of this system.

(Refer chapter 2 paragraph 2.2.2. page 13)

The purpose of this chapter is to develop an approach which could be used in designing and maintaining such an information system. A basic framework for an "intelligence system" will be provided which could possibly effect an early start of the implementation of the system, as well as of any transportation economic research activities which are associated with an information system of this nature.

6.2. Basic information requirements:

The basic information requirements of a transportation intelligence system are laid down not only by the function of the transportation industry but also by its' organizational structure as well as the economic structure of the country.

The function of the transportation industry is to bridge the gap which separates producers and consumers. It, therefore, assists the producers in marketing the relative surpluses of their production processes in geographic areas where a demand exists for those surpluses. The magnitude of the function of the transportation industry is clearly a function of the interaction of the following variables -, viz, the relative surpluses produced or the supply of goods, the demand or extent of the market for those surpluses, and the size of the gap in terms of time and distance which separates the producer from the consumer.

(Cf. A.M. Milne, op. cit., pages 11 to 17, also H.S. Norton, Modern transportation economics, Columbus, Ohio 1963, pages 3 to 8, and A.E. Scheurkogel, op. cit., pages 18 to 23).

The function of transportation, therefore, demands that the transportation information must make provision for the collection of factual information relative to the supply of goods, the demand for those goods, as well as the distances over which the goods must be transported.

The objective of a government transportation policy is to ensure that an adequate and economically and financially sound transportation industry is maintained. The transportation should not only be physically adequate, i.e. that sufficient transportation capacity is available to meet the ton-mile demand for transportation capacity, but the transportation should also be performed at the least cost to the community.

(Cf. C. Verburgh, (op. cit., pages 2 to 4),
on the aims of a transportation policy.)

The organizational structure of the transportation industry demands that the transportation intelligence system should cater for factual information relative to the demand for competitive transportation capacities resulting from the supply of and demand for production surpluses, the supply of competitive transportation capacities and the cost of providing those capacities by alternative transportation suppliers to meet the demand.

The economic structure of the country makes it necessary for the transportation intelligence system to differentiate between the transportation supply and demand requirements of the various sectors of economic activity. A broad classification of the economic sectors which require transportation of goods would be:

Agriculture

Mining

Industry.

Commerce

Government and Public Authorities, etc..

6.3. The development of a transportation intelligence system:

In developing a transportation intelligence system a simple transportation model is provided which illustrates the basic information which would be required by such a system. The information requirements of the system are considered and practical difficulties which could be encountered are analysed.

6.3.1. Illustrative transportation model:

For the purpose of illustrating the use to which transportation demand, transportation capacity supply and transportation cost information can be put, a simple transportation model based on hypothetical details will be constructed:-

- a. Production and/or consumption centres = A, B, and C.
- b. Transportation distances between centres:
 - A to B = 50 Miles.
 - B to C = 100 Miles.
 - C to A = 150 Miles.
- c. Products produced = 1, 2 and 3 respectively.
- d. Production surpluses requiring transportation from the production centres indicated. (The production centres' own demands are not shown).
 - A1 = 400 tons.
 - B2 = 600 tons.
 - C3 = 1100 tons.

e. Demand for surpluses at the consumption centres indicated:

A2 = 200 tons.
A3 = 600 tons.
B1 = 100 tons.
B3 = 500 tons.
C1 = 300 tons.
C2 = 400 tons.

The following information tables can be constructed from the data given above:-

Table 1 - Geographic distribution of production surpluses:

Production centre	Product	Surplus (Tons)
A	1	400
B	2	600
C	3	1100

Table 2 - Transportation or goods-flow table: (tons)

			Tonnage demand at centres		
Production centre	Product	Surplus tons	A	B	C
A	1	400	-	100	300
B	2	600	200	-	400
C	3	1100	600	500	-
	Totals	2100	800	600	700

Table 3 - Table of distances: (miles)

From \ To	A	B	C
A	-	50	150
B	50	-	100
C	150	100	-

Table 4 - Goods-flow table indicating transportation demand in ton-miles between centres:

			Ton-mile demand between centres			
Production centre	Product	Surplus tons	A	B	C	Total
A	1	400	-	5,000	45,000	50,00
B	2	600	10,000	-	40,000	50,00
C	3	1100	90,000	50,000	-	140,00
Totals		2100	100,000	55,000	85,000	240,00

This table provides an indication of the ton-mile demand for transportation between production and consumption centres.

Table 5 - Two directional flow of goods between production and consumption centres:

Goods flow between centres	Ton-miles		Total ton- miles	Minimum capacity requirements ton-miles	Available capacity tons-miles	Capacity utilization
	In	Out				
A to B to A	5,000	10,000	15,000	10,000	20,000	75%
B to C to B	40,000	50,000	90,000	50,000	100,000	90%
C to A to C	90,000	45,000	135,000	90,000	180,000	75%
Total:	135,000	105,000	240,000	150,000	300,000	80%

The above table derived from the information in tables 2, 3 and 4, gives the two-directional flow of goods in ton-miles between production and consumption centres.

The "minimum capacity requirement" is a function of and is equal to the maximum flow of goods in a single direction between centres. The "available capacity" is equal to twice the "minimum capacity requirement."

"Capacity utilization" is determined by expressing the "total ton-miles" between centres as a percentage of the "available capacity". The capacity which is not utilized between given centres can be considered to be an inherent under-utilization factor, which is due to an ill-balance which exists between the relative two-directional flow of the transportation of goods. A certain amount of empty running, therefore, is inevitable.

6.3.1.1. Calculation of transportation capacity requirements:

In order to calculate the transportation requirements in terms of a number of transportation vehicles of a given carrying capacity, it is necessary to consider both the time period in which the transportation must take place and the speed at which the vehicles can operate in transporting goods.

The number of vehicles of a given carrying capacity required to transport a given tonnage over a given distance in a given time can be calculated by using the following equation:-

$$N = \frac{2 \cdot V \cdot D}{C \cdot A}$$

N = Number of vehicles of a given capacity.

V = The volume of traffic in the loaded direction between centres.

D = The distance over which goods have to be transported.

C = The carrying capacity of the vehicles concerned.

A = The distance which the vehicle can cover in the given time allowed for the transportation of the goods.

It should be noted that only one transportation medium was considered in the above illustrative model. In practice the situation would be far more complex as a result of the interaction of different variables such as:

1. the number of alternative transportation media available and their existing capacities;
2. the diversified nature of the goods which have to be transported and the influence of the weight/volume relationship of various categories of goods on the variable cost of transportation per ton-mile. (It should be noted that different categories of goods would result in different transportation cost break-even situations in terms of mileage);
3. the user's freedom of choice which would have a significant effect on the allocation or planning of capacities required for alternative transportation media. (This allocation is a function of the demand for a particular transportation medium, which could be established in relation to historical information relative to that demand);
4. seasonal fluctuations in transportation demand; etc.

6.3.2. Information requirements of the transportation intelligence system and possible practical difficulties:

The design of a transportation intelligence system in practice would follow the same basic approach as the illustrative transportation model detailed above and should make provision for:-

1. a geographical structural analysis of the output of the various economic sectors which produce goods;
2. a structural analysis in respect of the available transportation capacities, and
3. the costs of alternative means of transportation (refer chapters 4 and 5 for details).

6.3.2.1. Geographical structural analysis and goods-flow tables:

The purpose of a geographical structural analysis of the economic activities of various sectors would be to determine the output volume of various categories of goods which require transportation to demand areas. In effect, this structural analysis could lead to an economic input/output goods-flow table which would give the movement of goods between supply and demand areas.

In the construction of goods-flow tables cognisance in particular should be taken of the following practical problems:-

1. The output and goods-flow information obtained in respect of various categories of goods should be given in terms of tonnage, since this measure together with the miles separating the supply and demand areas forms the output criterion of the transportation system.

(Refer chapter 4 paragraph 4.3.2. for unit of output.)

A revision or adaptation of existing statistical information in Rhodesia, therefore, would be necessary in order to comply with the requirements of the goods-flow information.

(Cf. Agricultural production in Rhodesia - 1964, Central Statistical Office, Salisbury. The following "units of measure" are used:-

- i. Bags weighing 200, 150, 125, 65, 180, 37½ and 28 pounds respectively.
- ii. Other measures such as: lbs, head of cattle, etc.)

As regards agricultural output, the conversion would be relatively simple since most "units of measure" are expressed in terms of weight or a measure which could readily be converted to a tonnage basis.

Statistics relative to the output of the mining industry would also be simple since outputs are in terms of tonnages produced. The determination of an output in terms of tonnage for the commercial and industrial sectors of the economy could be more difficult, since output data are available only in monetary terms and conversion cannot always be readily effected due to the diversified nature of the products. (Cf. The census of production in 1964. Mining, manufacturing, construction, electricity and water supply, Central Statistical Office, Salisbury).

2. The uniformity of geographic production areas and transportation areas would have to be considered, specifically as regards the agricultural sector. One of two approaches could be taken, viz., a re-classification of existing intensive conservation areas (I.C.A.'s) to correspond with the proposed controlled transportation areas, or alternatively, the adaptation of the proposed controlled areas to the existing I.C.A.'s. In effect all that would be required is that I.C.A.'s would have to be cross-referenced to indicate in which transportation area they are situated.

Since the Central Statistical Office makes use of electronic computers, all that would be required is that the I.C.A. codes which are used should also indicate the transportation areas. Output statistics could then be prepared on both I.C.A. and transportation area bases.

3. The determination of the demand areas for the various categories of goods produced could lead to problems, specifically as regards industrial production. In the case of agricultural production no problem would arise since a large portion of the total output of agriculture is handled by the various marketing boards. All tobacco, for example, is transported to the auction floors in Salisbury. The transportation of minerals to consumption areas, could also be easily determined.

4. A further problem could be the classification of goods into distinct product categories. It is proposed that the decimal classification system which is used for external trade statistics be adopted as a uniform national goods classification system throughout Rhodesia.

(Cf. Annual statement of external trade 1965, compiled and issued by the Central Statistical Office, Salisbury).

5. It must be remembered that the output of one economic sector becomes the input of another. The system, therefore, should guard against duplication.

6.3.2.1.1. The compilation of goods-flow tables:

Goods-flow tables can be compiled either by recording the actual goods-flow which has taken place, or else as a projection of the probable goods-flow in the future.

Both these approaches are recommendable. The historical goods-flow tables could fulfil a useful purpose as a basis for a prognosis of long-term transportation demand. The disadvantage of this method is the tremendous administrative effort which initially would be involved in acquiring historical information from, say, 1960 onwards. If a start were made with the collection of new information the advantages of this information could only be reaped in years to come.

It would seem logical to collect information relative to the expected goods-flow of various goods. The advantage of this collection method is that a prognosis would in fact be effected by a large number of producers in respect of the various goods categories which they produce. Each producer would provide an independent estimate of his own production.

In order to illustrate the approach which is recommended for the compilation of goods-flow tables, the agricultural sector will be used as an example.

Goods flow-tables indicating the probable flow of goods could be compiled in respect of the various crops produced by farmers. Questionnaires which make provision for both agricultural output and input information could be distributed to all farmers in Rhodesia.

☞ (Refer Annexure 7 page A78 for an example of a possible questionnaire which could be used for the purpose of establishing the transportation demand for the agricultural industry.

This questionnaire not only makes provision for expected total crops but also for information on the possible distribution of the crops over the indicated months of the year. Furthermore since farmers usually know where the markets for their crops are situated, e.g. tobacco in Salisbury, maize at the nearest Grain Marketing Board depot, etc., they are asked to indicate the distance which is involved in marketing their crops in respect of both road and rail transportation, own transportation by road being provided by a % indication.)

A consolidation and an analysis of the information obtained from the questionnaires would provide the transportation research economist with transportation ton-mile demand information on the bases of products, transportation areas and calendar months. This ton-mile demand information could be used for comparative purposes as regards the availability of transportation capacity in the various transportation areas. Obvious shortages and/or excess capacities could then be catered for.

It should be noted that mathematical accuracy cannot be expected from these estimates. They, however, would provide some indication of the order of magnitude of the possible demand for transportation. The attitude which should be adopted is that any information is better than none. Historical information on the production of crops could be used to check whether crop estimates were in fact reasonably realistic.

An approach which may well be worthwhile to Rhodesia would be to make use of ranking in the collection of crop estimate information. Statistical production information is currently available at the Central Statistical Office as regards both agricultural input and output. It would be a relatively simple task to rank individual farmers in accordance with their combined input/output volumes. Questionnaires could then be sent to those farmers only whose combined volumes were responsible for the major part (say 80%) of the total agricultural input/output. An information system based on this ranking approach would have the advantage that only a small number of large-scale farmers would need to be subjected to the questionnaires and consequently the administrative costs involved in processing the information would be less than that of a 100% coverage.

The same approach could be adopted in respect of mining, commerce and industry.

An attempt was made to establish the demand for the internal transportation of agricultural goods in Rhodesia, for the calendar year 1965. Although detailed goods-flow tables were constructed, Annexure 8 pages A80 to A91 gives only the summarized and final transportation demand figures in respect of the demand for rail and road transportation.

6.3.2.1.2. Other uses of goods-flow information:

Any statistical information which is collected can normally be subjected to a number of uses. The construction of goods-flow tables is dependent on the provision of information relative to:

- a. product,
- b. production area,
- c. consumption area,
- d. quantity requiring transportation;
- e. transportation media, and
- f. relative distances between the production and the consumption areas.

This information could be used for the purpose of transportation planning, control and co-ordination, as well as for the preparation of actual or expected production statistics. The addition of information relative to the value of the goods and to the industries or sectors which produce and use the goods would make it possible to construct inter-industry flow-tables. This information is considered vital for the national economic planning of Rhodesia and the question which arises

is how this basic statistical information could best be used for different purposes.

(Cf. A. Ghosh, Experiments with input/output models, Cambridge University Press, Cambridge 1964).

6.3.2.2. Structural analysis of the available road transportation capacities:

Having established a basis for the collection of information relative to the demand for transportation capacities, it is essential to formulate an approach for collecting information on the supply of transportation capacities and the utilization of these capacities in given areas.

All that would be required in this instance is that information, specifically as regards the road motor transportation industry be collected since the Railways have adequate information in respect of the availability and utilization of rail trucks. A consideration of rail truck capacity requirements, therefore, would not need to be undertaken, but a close co-operation between the Railways and the transportation research economist would be a necessity.

Two approaches could be adopted in order to obtain the required information. Questionnaires could be distributed to all road hauliers and information could be obtained from special field studies which would involve the actual physical inspection of the goods carried by road vehicles over given routes or in given areas.

(Cf. C. Verburgh, (Road transport of goods in South Africa, Stellenbosch, 1959) for details in respect of an approach which was followed to determine the structure of, and the tonnages transported by the road transportation industry in South Africa).

In the collection of road transportation information it is important also to differentiate between the various suppliers of road transportation in order to be able to assess the relative magnitude of the competition which is involved. (Refer Annexure 12 page A159 for information relative to "other road vehicles" and Annexure 6 page A71 for information relative to Public Service Haulier vehicles).

A questionnaire was submitted by the Central Statistical Office, Salisbury, to Public Service Hauliers and useful information has already been obtained in respect of, inter alia, the available capacities, the use of these capacities, the cost of transportation etc.

(Refer Annexure 6 pages A61 to A70 for details contained in this questionnaire to Public Service Hauliers and Annexure 6 pages A71 to A76 for an analysis of some of the information collected in respect of the road transportation industry).

With the aid of information in respect of the demand for and the supply of the transportation capacities of alternative transportation media and the cost of transporting various goods or categories of goods by means of these media, a sound transportation policy could be achieved. Since this information is not yet available, it is essential that interim measures be introduced in working towards the objectives of the ultimate long-term policy.

PART III - INTERIM MEASURES

Since a long-term transportation policy cannot be put into effect overnight, possible interim measures which in the meanwhile could yield economic and other benefits are discussed. The possible cost effects of diverting certain goods transportation from rail to road, and vice versa, are considered.

CHAPTER 7

POSSIBLE INTERIM MEASURES WHILST WORKING TOWARDS THE PROPOSED ULTIMATE LONG-TERM TRANSPORTATION POLICY

7.1. Introduction:

Any recommendations in respect of interim measures to be adopted in working towards a long-term maximum goods transportation system pre-suppose that the basic principles on which the long-term transportation policy is formulated have been accepted.

Briefly the basic principles for a long-term transportation policy for Rhodesia as set out in Chapter 3, are:-

1. that both rail and road tariffs reflect the cost of rail haulage and road haulage respectively for various categories of goods,
2. that the user have freedom of choice as regards the transportation medium used to meet his transportation requirements, and
3. that transportation suppliers be afforded equal treatment as regards competition possibilities.

These principles can be reformulated to form the basis of any interim measures.

- a. The average cost of rail and road transportation of goods should be used as a basis for determining the relative economic transportation domain of the respective competitors.
- b. The user should as far as is economically justifiable have a freedom of choice as regards transportation mediums available.
- c. The transportation suppliers should as far as is economically justifiable be afforded equal treatment as regards competition possibilities.

The reason for the introduction of interim measures or an interim transportation policy, is to obtain economic and other benefits from an early move in the direction of the ultimate policy. The purpose of this chapter is to formulate interim recommendations regarding the transportation of goods in Rhodesia.

Although the emphasis is placed on a comparison of the transportation costs of the Rhodesia Railways and Public Service Hauliers, consideration is also given to recommendations in respect of private goods vehicles which are operated on the various owners' own account. These goods vehicles are not permitted to operate on a "hire or reward basis", but are allowed to transport the particular owner's goods anywhere in Rhodesia and thus provide competition to the Railways and Public Service Hauliers.

7.2. The use of known transportation costs as a basis for the formulation of interim recommendations regarding Rail and Public Service Haulier competition:

In the absence of accurately determined transportation costs in respect of various goods or categories of goods for both the Rhodesia Railways and the Public Service Hauliers. there was no other alternative but to accept average transportation costs as the basis on which interim recommendations could be formulated.

A Public Service Haulier can be defined as any road transporter who has been issued with a permit in terms of The Roads and Road Traffic Act - Chapter 289 of Rhodesia for the purpose of using a motor vehicle or trailer in Rhodesia for the haulage of goods for hire or reward on one or more occasions.

In using average costs it must, however, be kept in mind that a certain amount of deviation from the average will always be present. Where possible this deviation should be taken into account. For the purpose of illustration the following hypothetical road transportation cost information is considered:-

Assume that three road hauliers provided the following variable transportation cost information for similar conditions per ton-mile of transport:-

Haulier No. 1	3d per ton-mile.	
Haulier No. 2	3.5d per ton-mile	= Average cost.
Haulier No. 3	4d per ton-mile.	

Haulier No. 1 could be considered as the most efficient of the three hauliers but would be penalized by a restriction on say the operating distance allowed, resulting from a cost comparison between rail and road if a 3.5d per ton-mile road cost were used in the comparison. Haulier No. 3 on the other hand would be favoured by the use of the average cost of 3.5d per ton-mile. This problem can be minimised by introducing an extreme element of conservatism into the figures used in effecting a comparison between the alternative transportation mediums.

7.3. Analysis of the transportation costs of the Rhodesia Railways and Public Service Hauliers:

The purpose of an analysis of the supplier's transportation costs is to establish the relative economic merits of the alternative mediums of transportation. In principle this analysis is restricted to Public Service Hauliers in competition with the Rhodesia Railways.

It is interesting to note the views of A.M. Milne on the costs of alternative mediums of transport. "Obviously it is impossible to state categorically that for this distance and for this traffic, road will be more economic than rail and for other distances and other traffics rail will be more economic than road. The answer in particular circumstances will depend on these circumstances."

(Cf. A.M. Milne, op. cit., chapter V, page 113.)

The above statement, however, does not imply that a cost comparison of the costs of transportation of alternative suppliers in respect of specific goods over given routes cannot be effected. The emphasis is on the "particular circumstances" which prevail. These particular circumstances are the user circumstances which are taken into account by the specific user when making a choice between alternative transportation mediums.

In this study break-even analyses between rail and road transportation were made. Although an attempt was not made to calculate a break-even point for rail and road for particular commodities over particular routes for particular circumstances, the break-even analyses are indicative of national averages irrespective of the product or route. The costs of rail and road transportation are discussed individually before giving the break-even analyses.

(Cf. E.C. Poole, (op.cit., pages 90 to 94) : where a comparison is effected between rail and road transportation costs. These cost comparisons also provide an indication of freight rates based on the principle of what the traffic can bare, and their relation to cost).

7.3.1. Rhodesia Railway transportation costs:

At this stage of the development of the costing system employed by the Rhodesia Railways information on the costs of transporting specific goods or categories of goods, over specific rail routes or distances, was not available.

The only costs which could be calculated were:

- a. overall average variable costs of transporting one ton of goods over one mile, and
- b. the average fixed terminal costs per ton handled:

Annexure 9 page A93 provides an analysis of the Rhodesia Railways transportation costs as incurred during the financial year ending 30th June, 1965. These costs were used in effecting a comparison between rail and road transportation.

7.3.1.1. Rhodesia Railway unit costs:

The following unit costs were obtained from Annexure 9 page A93, in respect of rail transportation operations:

a. Average variable cost per ton-mile:

Operating or running costs	=	0.8620d
Administration and policy costs	=	<u>0.3441d</u>
Total average variable cost per ton-mile	=	<u>1.2061d</u>
	say	= 1.21d

b. Average fixed terminal costs per ton:

Shunting and yard costs	=	55.92d
Traffic costs	=	29.56d
Handling costs	=	<u>169.25d</u>
Average total fixed terminal cost per ton	=	<u>254.73d</u>
	say	= 255d

The above unit costs form the basis of the rail transportation costs used in the average break-even analyses between rail and road transportation given in paragraph 7.3.3 of this chapter.

7.3.2. Public Service Haulier costs:

The following unit costs are based on the information contained in Annexure 6 page A76 which provides an analysis of Public Service Haulier road transportation costs. These costs are based on a questionnaire which was sent to the Public Service Hauliers. (Refer Annexure 6 page A60, "Public Service Hauliers Enquiry").

Road transportation unit costs:

(In Rhodesian pence)

Cost description	Firms		
	5 Largest	Next 5	Next 5
a. Total cost per ton-mile.	4.98d	4.16d	2.95d
b. Average variable costs per ton-mile.	2.88d	3.15d	1.73d
c. Average fixed cost per ton hauled.	139d	139d	139d

7.3.3. Comparison of rail and road transportation costs:

In order to compare the costs of rail and road transportation use is made of the technique of cost break-even analysis. The purpose of this technique in this instance is to determine over which average distance one form of transport will be more economical than the other. It is, therefore, an objective tool for establishing a criterion which could be used for the purpose of co-ordinating transportation more efficiently.

Mathematically the notation used for a mileage break-even point calculation is as follows:

$$M = \frac{A - B}{X - Y}$$

where

M = The break-even point in terms of miles, i.e., that distance for which the total cost for one ton of goods using road transport would equal the cost of rail transport.

A = Average fixed terminal cost per ton in respect of rail transportation of goods.

B = Average fixed cost per ton in respect of road transportation of goods.

X = Variable cost per ton-mile by road.

Y = Variable cost per ton-mile by rail.

If the variable and fixed costs per ton-mile and per ton, as determined in paragraphs 7.3.1.1. and 7.3.2. for rail and road transportation of goods respectively, are substituted in the above equation the following break-even points are derived:

- a. For the five largest road haulier firms in comparison with the Railways:

$$\begin{aligned} M &= \frac{255}{2.88} - \frac{139}{1.21} \\ &= \frac{116}{1.67} \\ &= 69.4 \end{aligned}$$

M = approximately 70 miles.

Rail transportation of goods in this instance becomes more economical than road transport after 70 miles, which is the break-even point in the above comparison.

- b. For the next five largest road haulier firms in comparison with the Railways:-

$$\begin{aligned} M &= \frac{255}{3.15} - \frac{139}{1.21} \\ &= \frac{116}{1.94} \\ &= 59.8' \end{aligned}$$

M = approximately 60 miles.

In this case rail transportation of goods becomes more economical after 60 miles, which is the break-even point in the above comparison.

- c. For the third five largest road haulier firms in comparison with the Railways:

$$\begin{aligned}
 M &= \frac{255 - 139}{1.73 - 1.21} \\
 &= \frac{116}{.52} \\
 &= 223.08 \\
 &= \text{approximately 223 miles.}
 \end{aligned}$$

In this instance rail transportation of goods becomes more economical after 223 miles, which is the break-even point in the above comparison.

7.3.4. Average break-even position for the above three groups of road hauliers in comparison with the Railways:-

In the above break-even analyses the calculated break-even points were 70, 60 and 223 miles respectively.

An average break-even point can be calculated by applying the number of road vehicles in each group of 5 firms as a frequency value in the following formula:-

$$\begin{aligned}
 \bar{X}_m &= \frac{\sum_{i=1}^n F_i X_i}{n} \\
 \text{or} \quad \bar{X}_m &= \frac{F_1 X_1 + F_2 X_2 + F_3 X_2 + \dots + F_n X_n}{n}
 \end{aligned}$$

/where $\bar{X}_m$

where

- $\bar{X}_m$ = The average break-even mileage in excess of which rail transportation of goods will be more economical than the road transportation of goods.
- F_i = The number of vehicles in each of the groups of the 5 road transportation firms for which individual comparisons with the Railways were made. (Frequency values).
- X_i = The break-even distance for each group of five firms mentioned above.
- n = Total number of road vehicles (refer Annexure 6. page 476)

By substituting the relative values in the above formula the following is obtained:

$$\begin{aligned}\bar{X}_m &= \frac{(843 \times 70) + (193 \times 60) + (31 \times 223)}{1117} \\ &= \frac{59,010 + 11,580 + 18,063}{1117} \\ &= \frac{88,653}{1117} \\ &= 79.3\end{aligned}$$

Average break-even distance = approximately 80 miles.

On a national average basis rail transportation of goods becomes more economical than road transport after 80 miles.

On the basis of this analysis it is recommended that in principle a break-even distance of 80 miles be used as the basis on which interim measures are formulated in respect of rail and road transportation competition.

As regards the comparison which was made of the transportation costs of the Railways and Public Service Hauliers, it should be remembered that average costs were established for the calendar year 1965 only as per - U.D.I. information was not for publication. This average cost analysis can, therefore, only serve as a guide for a possible interim policy until such time as more recent transportation costs in respect of rail and road become available.

7.3.5. Built-in conservatism in the mileage - break-even point calculations in respect of the rail versus road transportation of goods:-

The road transportation industry is favoured by the break-even calculations for the following reasons:-

/a

- a. Since information relative to the capacity utilization of road transportation vehicles was not readily available, the variable costs per ton-mile of road transportation used in the calculations, were in terms of 100% capacity utilization. It can safely be assumed that a capacity utilization of 80% would in fact be reasonable as regards road motor transportation of goods. If the break-even calculations were based on this utilization factor the following break-even points would be derived:-

Five largest firms	approximately 47 miles.
Next five largest firms	approximately 43 miles.
Next five largest firms	" 122 miles.
Average break-even mileage for 15 firms	approximately 52 miles.

The above break-even mileages are based on the variable costs per ton-mile of each of the groups of five firms multiplied by the factor $\frac{100}{80}$.

- b. The variable cost per ton-mile in respect of the Railways included an amount of £5,226,446 in respect of "empty running" of goods rail trucks. This amounted to more than 25% of the total running cost of the Railways for the year ended 30th June, 1965. (Refer Annexure 9 page A93 for "empty running" cost figures).

- c. The Administration and Policy costs of £7,692,730 (Refer Annexure 9 page A93) were fully allocated to the goods transportation function of the Railways. In actual fact, however, a certain part of these costs could have been allocated to the passenger transportation services performed by the Railways.
- d. Provision was not made in respect of Public Service Haulier costs as regards their share of the costs of providing and maintaining adequate road systems.

In the publication - "Highway Economics with special reference to the Republic of South Africa," Part IV Chapter II, page 267 - by A.E. Scheukogel, consideration is given to various techniques which could be used for the apportionment of highway costs to various classes of road users. (Unpublished thesis 1966 Stellenbosch).

7.4. The use of the rail/road transportation break-even distance of 80 miles as the basis for formulating interim measures:-

In terms of the reformulated basic principles which form the basis of interim measures, the straight forward introduction of an 80 miles limitation on the operations of all Public Service Hauliers would not be feasible. The reasons for this are that the transportation user's freedom of choice would be impaired by such a restriction and that transportation suppliers would not be afforded equal treatment as regards competition possibilities.

Vested interests would, as far as possible, have to be taken into account provided the transportation services offered by these interests could be justified economically.

7.5. Measures which could be considered during the interim period:-

Various measures which could be introduced are considered below in respect of:-

- Public Service Hauliers,
- Own account transportation suppliers,
- Rhodesia Railways

7.5.1. Public Service Hauliers:

/7.5.1.1.

7.5.1.1. Public Service Hauliers at present in possession of radius permits:

At present a number of Public Service Hauliers are granted transportation radius permits which restrict their transportation operations to given areas situated around towns. These radii in certain instances are as great as 120 miles from given centres.

It is suggested that Rhodesia be divided into controlled and uncontrolled areas for the purpose of introducing transportation restrictions. Controlled areas with a radius of 40 miles would be situated around railway lines and would have as central points towns situated on these railway lines. The objects of having controlled transportation areas would be the following:-

- i. To ensure that adequate road transportation capacity were available in a particular area to meet the demand in that area. Cut-throat competition would be eliminated, since a fair balance between the supply of and the demand for transportation capacity could be established.
- ii. To allow free competition between rail and road within the boundaries of controlled areas.
- iii. To simplify the control of transport operations within the areas.

Detailed consideration would have to be given to the boundaries as well as the centre points of these areas. All large towns on railway lines could be considered for central points. This might, however, result in an overlapping of areas. Alternatively, adjacent areas could be considered. The centre points of these areas could be Bulawayo, Gwelo, Gatooma, Salisbury, Lion's Den, Fort Victoria, Umtali, Headlands and West Nicholson.

All areas which are not considered as controlled would be classed as uncontrolled areas. These uncontrolled areas are not served by railway lines. In creating controlled and uncontrolled areas possible disadvantages might arise. All existing permits, for example, would have to be reconsidered in order to effect a re-classification as regards radius restrictions and areas.

This could cause an administrative problem and might possibly lead to interim hardships as regards specific vested interests.

An analysis of existing Road Service Board permits presently in force should be made in order to establish the exact magnitude of this re-classification problem.

If existing permits could, as far as is economically possible, be retained, the disruption which would be caused, would be limited. Vested interests would also be protected as regards specific operational areas. The disadvantage of the existing radius permits is that because the areas covered by these permits overlap one another tremendously the planning for and co-ordination of transportation capacities to meet the demand are thereby hampered.

Recommendations in respect of existing
radius permits:

It is recommended that the creation of controlled and uncontrolled areas be given serious consideration. Public Service Hauliers who are in possession of existing radius permits should qualify for the new proposed 40 mile radius permits. These new permits would in principle restrict their competition with the Railways to within the boundaries of the proposed controlled areas.

Controlled area permit holders should be allowed to transport goods to and from any uncontrolled area to the controlled area for which their permits are valid. Their normal transportation operations should, however, be restricted to their newly allocated controlled areas.

Permits should also be issued to hauliers in uncontrolled areas. Uncontrolled area permit holders should not be restricted by radius permits and should be allowed to carry goods between controlled and uncontrolled areas. They should, however, be restricted from collecting goods within controlled areas and delivering the same goods in the same or any other controlled area.

Provision should also be made for special area-interlocking permits which should be granted to a limited number of the controlled area permit holders. The purpose of these area-interlocking permits would be to allow the transportation of goods between adjacent controlled areas. Since a railway line between two adjacent controlled areas

could cover a distance of at least 160 miles (i.e. four times the length of the radius of the controlled areas around the railway line), it would be essential to place a restriction on the distance over which the road transportation of goods can be undertaken.

This distance restriction could be effected by an endorsement on the permit which would specifically restrict the road transportation of goods between given centres which are more than 80 miles apart.

7.5.1.2. Public Service Hauliers at present in possession of open permits and route permits:

Open permits which enable a haulier to carry goods anywhere in Rhodesia were granted to a number of Public Service Hauliers. Route permits cover the transportation of goods over given routes between specified centres.

These permits, together with radius permits in excess of 40 miles, provide the largest area of competition between rail and road and the problem of rail/road co-ordination must be faced particularly in this competitive area.

Recommendations in respect of existing open permits and route permits:

In accordance with the reformulated basic principles in respect of user freedom of choice and equal treatment of transportation suppliers, it is proposed that open permits and route permits be retained by existing permit holders. It would, however, be necessary to impose certain restrictions on these permit holders to obviate unfair competition with the Railways on long distance haulage.

In order to ensure that transport users have a free choice of transportation mediums and that fair competition exists between long distance road haulage and railway transportation the introduction of an interim price mechanism should be considered. The purpose of this price mechanism would be to work towards the objective of tariffs which reflects costs.

Long distance transportation levies which could be paid to the Railways to compensate them for any lost traffic, could be imposed on Public Service Hauliers. Alternatively, the levies could be paid into a centralized Government fund which could be used for the purpose of subsidizing uneconomic transportation operations imposed by the national interest.

Long distance levies should be calculated in respect of the existing tariff rates of the Rhodesia Railways. These levies should be such that they approximate the differences in cost between the alternative means of transport.

The Public Service Hauliers at present charge at least the railway tariff over long distances. If a levy is paid to the Railways it might be found that these hauliers could in effect raise their tariffs to above that of the railway tariff. The rise in the road tariffs would then off-set the levies.

Transportation levies could be based on:-

- a. a fixed percentage of the railway tariff for the goods transported over a given distance, or
- b. a fixed levy per annum based on the capacity of the road vehicles employed over long distances.

7.5.1.3. General considerations for all categories of Public Service Hauliers:

a. Improved capacity utilization:

At present the Road Service Board issues permits to Public Service Hauliers. These permits are based on operations relative to given areas (radius and otherwise), routes and products.

Capacity utilization of vehicles is often hampered, specifically with regard to permits which restrict Public Service Hauliers to the transportation of given products.

It is felt that capacity utilization of these vehicles could possibly be increased if open permits were given to Public Service Hauliers in a given area or over a given route. This would also increase competition between the hauliers in these areas so that inefficient hauliers would either have to adapt or else die out.

b. Long distance transportation exceptions:

Certain exceptions would have to be made with regard to the road transportation of goods over long distances. These exceptions can be classified into two distinct categories:

1. Permanent exceptions:

Permanent exceptions should only be granted to those products which for technological reasons cannot be transported by rail and may include awkward loads, fresh farm produce, etc.

- 2. Temporary exceptions:

Temporary exceptions would have to be made in cases where the Railways, for one reason or another, are unable to cope with the transportation demand. These exceptions could be granted on a permit basis and could either be trip-orientated or product-and period-orientated. In instances where the Railways could provide the service, but where due to special user circumstances long distance road haulage must be used, special permit fees and road transportation levies could be introduced.

(Refer Annexure 2 page A20 for the views of Public Service Hauliers on various aspects of the transportation industry in Rhodesia).

7.5.2. Own account transportation suppliers:

There are various groups of own account transportation suppliers who at present are permitted to carry their own goods anywhere in Rhodesia. These groups are mainly:

Commerce and industry,
Agriculture, and
Mining.

Own account transportation suppliers are not permitted to transport goods on a hire or reward basis.

These own account transportation suppliers could become a serious competitive threat to both the Rhodesia Railways and Public Service Hauliers if restrictive measures are not introduced to control the extent of their operations.

7.5.2.1. Recommendations in respect of own account vehicle

7.5.2.1.1. Commerce and industry:

Since commerce and industry are generally situated in towns and, therefore, near railheads, a radius restriction of 20 miles would appear to be more than sufficient to allow the transportation of goods from suppliers to customers or to the nearest railhead. A special permit need not be obtained for this transportation. This proposed restriction should only apply in the controlled areas.

Commercial and industrial transport between the 20 and 40 mile radius limits would probably be absorbed by Public Service Hauliers as a result of their lower costs of transportation over shorter distances.

(Refer Annexure 12 page A159
for the relative importance of
commercial and other vehicles in
Rhodesia).

Commerce and industry should be allowed to apply for special permits to carry their own goods over distances greater than those imposed by the 20 mile radius restriction. Long distance transportation levies could be introduced whenever these special permits are issued. Commerce and industry could be allowed to form transport syndicates operating on behalf of their members within the imposed radius restrictions.

7.5.2.1.2. Agriculture- Farmer syndicates:

Farmer syndicates should be granted special permits to carry agricultural products and requirements only. They should, however, be subjected to the same radius restrictions as Public Service Hauliers. Syndicates should be allowed to transport goods for their members only. This transportation could be regarded as transporting on their own account.

Certain exceptions would, as far as radius restrictions are concerned, have to be made for fresh farm products which have to be transported to markets. On these trips agricultural requirements could be transported back to farms.

(Refer Annexure 4 pages A45 to A49 for the transportation requirements of agriculture as set out in a memorandum prepared by the Rhodesia National Farmers' Union).

7.5.2.1.3. Agriculture- Farmer's co-operative societies:

These societies should in principle be subjected to the 20 mile radius restrictions imposed on commerce and industry, as regards their transportation requirements relative to products sold and bought by them. A special permit could be considered for these societies for their own transportation requirements for distances greater than 20 miles.

These societies should also be allowed to apply for full Public Service Haulier permits and should be subjected to the same restrictions and control as other Public Service Hauliers.

7.5.2.1.4. Individual farmers:

Individual farmers should be allowed freedom of movement as regards their own transport. They should, however, not be permitted to carry goods for hire or reward as this could lead to a serious disruption of the transportation industry.

7.5.2.1.5. Mining:

The mining industry should be allowed to use their own transportation freely to transport any requirements or products to the nearest principal town, in instances where they are not situated near railheads. Special permits can be considered for long distance transportation.

7.5.2.1.6. Other private goods vehicles:

Other private goods vehicles should be restricted to a 20 mile radius in the controlled areas where they may only operate on an own account basis.

7.6. Implementation and controls:

The implementation of the proposed interim measures should be such that a smooth transition is effected which will cause the least possible disruption to the transportation industry. Any controls which are introduced should be as simple as possible and compensation claims which may arise as a result of the interim measures should be restricted to a minimum.

The implementation of the proposed interim measures could be done in the following four stages:-

1. The proposed 20 mile radius restriction on commerce and industry should become the first interim measure to be introduced. The effects of this restriction cannot be predetermined and it will be necessary to wait and see what happens. The result of the restriction, however, can only be a positive one and should lead to an increased demand for road service permits. In order to evaluate the transportation demand effects of this 20 mile restriction on the different Public Service Haulier capacities, it is imperative that statistical information be available as regards "before and after" tonnage demand.

The additional demand for Public Service Haulier permits resulting from the restriction should not be dealt with on an application basis. Permits should be allocated by the Road Service Board to those hauliers who are in possession of radius permits which cover an area in excess of the proposed 40 mile radius.

2. The second interim measure to be introduced should be steps taken to divert uneconomic short distance goods traffic from rail to road. Once again the effect of this measure can only be a positive one as regards the demand for road transportation capacities. An increased demand for road service permits could again be expected. The demand for additional capacity could be used to compensate or off-set the probable drop in capacity requirements which could occur as a result of the implementation of the other interim measures.
3. The next measure to be introduced should be the introduction of long distance road transportation levies. As a result of the introduction of these levies a probable decrease in long distance road transportation capacities could be expected. This decrease would be off-set by the increased demand for capacities dealt with above.
4. As regards the issuing of new permits to agricultural syndicates and farmer's co-operative societies it is recommended that these should only be granted after the above measures have been introduced.

In order to enforce the various interim measures adequately, the introduction of the following controls could be considered:-

a. Vehicle identification and permit control:

Compulsory vehicle identification should be considered in respect of:

- i. owner,
- ii. permit group, and
- iii. transportation authorization - e.g. area/route, etc.

All vehicles should be made to carry and display identification boards.

b. Transportation piracy control:

It is apparent that a considerable amount of piracy is experienced from private hauliers who do not possess public service vehicle permits and who, therefore, are not allowed to transport goods for hire or reward.

One Public Service Haulier expressed his opinion on piracy as follows:

It is felt that a private haulier whether he be engaged in agriculture or industry, is always tempted to use his vehicle other than when it is fully occupied for the carriage of goods. Under the present system no controls exist which prohibit the private haulier in any way and it has been this company's experience that there has been a vast increase in the amount of pirating, not only by single vehicles, but by persons operating fleets of own purpose vehicles. Such pirating is obviously to the detriment of authorized permit holders and in the long term, not in the national interest". (Source:- Questionnaire answered by a Public Service Haulier).

The above view is fully supported. Over and above the restrictions which were proposed on commercial, industrial and other private vehicles it is furthermore recommended that any pirating should be subjected to severe punishment, - such as:

1. Confiscation of vehicles involved;
2. Confiscation of goods transported;
3. Heavy fines/imprisonment for pirate operators;
4. Heavy fines for users of pirate vehicles.

- c. Better control could also be achieved by increasing the existing number of Road Service Board inspectors.
- d. Control could also be achieved through the transportation economics intelligence system discussed in Chapter 6.
- e. All permit holders should be subjected to vehicle inspections, vehicle certificates of fitness, etc.

(Refer Annexure A2 pages A20 to A31 for the views of selected Public Service Hauliers on regulations and controls).

7.7. Possible effects of interim measures:

The introduction of interim measures is of significant importance as a move is already being made in the direction of the long-term transportation policy.

During the interim period the alternative transportation mediums would be guided into the transportation fields in which they could make the best use of the available scarce productive resources. These benefits can only be achieved for Rhodesia if particular interests are treated as secondary to the national interest of the country. The introduction of interim measures could have the following effects for the various categories of road transportation suppliers and the Railways.

a. Public Service Hauliers:

1. Positive effects:

- i. Increased tonnages and protection as a result of the general 20 mile radius restriction proposed for commerce and industry.
- ii. Better utilization of transportation capacity as a result of the lifting of the present restrictions relative to the transportation of specific goods.
- iii. Increased tonnages as a result of the proposed diversion of short distance traffic from rail to road.

- iv. Increased tonnages as a result of the transportation of goods from controlled to uncontrolled areas, and vice versa. (In principle the proposed 40 mile radius restriction only limits Public Service Haulier operations along railway lines).
- v. Equal treatment of transportation suppliers, since the issue of all road service permits would be subjected to the same conditions regarding vehicle inspections, certificates of fitness, etc.

2. Negative Effects:

- i. As a result of the lifting of the restrictions relative to the transportation of specific goods, increased competition between hauliers could be expected. Cut-throat competition, however, should not be allowed as this would be harmful to the industry. The implementation of minimum freight rates based on information supplied by Public Service Hauliers could be considered.
- ii. A limited number of Public Service Hauliers who at present are in possession of radius permits in excess of 40 miles could be severely affected. These permit holders should be given special consideration when a re-allocation of permits is considered.
- iii. Possible competition from farmer syndicates.

- iv. The introduction of long distance transportation levies, the purpose of which is to move in the ultimate direction of tariffs which reflect the transportation costs of the alternative suppliers, would result in a decrease of tonnages transported by long distance Public Service Hauliers in possession of open and route permits.

b. Commerce, industry and agricultural societies:

1. Positive effects:

- i. As a result of the proposed special permits as regards transportation of "own account" goods over distances in excess of a 20 mile radius, commerce, industry and agricultural societies, would be forced to adopt a more rational approach to their own transportation costs and capacity utilization. This could lead to a decrease in investments in transportation capacities as well as an increased utilization of the reduced capacities.
- ii. Since commercial and industrial syndicates would be allowed, transportation capacity utilization could be increased.

2. Negative effects:

Special permits would have to be obtained in respect of the "on own account" transportation of goods in excess of a 20 mile radius.

c. Agriculture - Farmer syndicates:

1. Positive effects:

As special permits are proposed in respect of farmer syndicates, increased capacity utilization of goods transportation vehicles could result. A decrease in total investment in vehicles could also be expected.

2. Negative effects:

The farmer syndicates would be subjected to the same regulations as Public Service Hauliers as regards vehicle inspections, certificates of fitness, etc.

d. Rhodesia Railways:

1. Positive Effects:

- i. Long distance haulage of goods would be increased as a result of the introduction of long distance transportation levies on Public Service Hauliers.
- ii. Short distance haulage of goods would be diverted to road transportation resulting in a loss in tonnage transportation. This loss in tonnage should, however, lead to a substantial reduction in the high transportation costs associated with short distance rail transportation of goods.

In respect of the proposed levy restrictions on the long distance haulage of goods by road, it is interesting to note that W. Harragin and others, in "Report of the commission of enquiry into the rating structure of the Rhodesia Railways, Salisbury 1959", came to the conclusion as regards rail and road competition that the road haulier should be limited to those transportation operations where his costs are lower than those of the Railways. In practice this would mean that road hauliers would be confined to the shorter distance hauls because it is there that their costs are lower than that of the railways....."

(C.F. Verburgh, op. cit., Chapter VIII pages 92 to 97. Verburgh describes the possible interim measures which could be introduced in South Africa in working towards a long-term economic transportation policy. The transportation situation in South Africa is somewhat different to that in Rhodesia and Verburgh's interim proposals are directed at lifting the severe restrictions which are imposed on the South African road haulage industry.)

In the next chapter the relative importance of rail and road transportation is discussed with special reference to the possible cost consequences which would have occurred had short distance rail transportation of goods been diverted from rail to road, and vice versa, during 1965.

CHAPTER 8

POSSIBLE EFFECTS OF DIVERTING GOODS TRANSPORTATION FROM RAIL TO ROAD AND VICE VERSA

8.1. Introduction:

In this chapter an analysis is made of the goods transported in Rhodesia in order to establish the relative importance of rail and Public Service Haulier road transportation. The purpose of this analysis is to assess the possible effects of diverting traffic from rail to road for distances up to 100 miles and long distance traffic from road to rail for distances over 100 miles. The analysis was made for the year 1965.

8.2. The relative importance of internal goods transportation to the Railways:

In order to determine the competitive areas of Rhodesia's internal goods transportation it was essential to establish the relative volumes transported by the Railways and the Public Service Hauliers. (See Annexures 11 and 6, pages A96 and A74 respectively).

Of a total of 14,757,000 tons ¹⁾ transported by the Railways in respect of revenue earning traffic during 1965, only 2,825,281 tons ²⁾, or 19.2% of the total tonnage, was in respect of Rhodesia's internal rail transport ³⁾. Expressed in terms of ton mileage, this amounted to approximately 724 million ton miles ⁴⁾. The total net ton-miles for all railway transportation (i.e. 14,757,000 tons) was 5,888 million ton-miles ⁵⁾.

The Railway's internal goods transport, therefore, represented only approximately 13% of the total ton-miles.

The following sources were used in respect of the figures mentioned in 1 - 5 above:-

1. Trend - Rhodesia Railways - Digest of performance, March, 1966 (Railway's internal publication).
2. Information obtained from a manual re-arrangement of special point-to-point and product tabulations for 1965, produced by the Rhodesia Railways Computer Division. (See also Annexure 10):
3. The balance of the total tonnage was made up as follows:

Rhodesia to Zambia = 9.8% of total transport.
Zambia/Botswana internal and to Rhodesia
= 21.6% of total transport.

Imports, exports and in transit
= 49.4% of total transport.
4. Based on information contained in computer tabulations mentioned in (2) above, ton-mile calculations were performed in respect of all internal transportation of goods in Rhodesia. The figure of 724 million ton-miles represents the total ton-miles involved. (See also Annexure 10 pages A155 & A156)
5. Trend - Rhodesia Railways - Digest of performance, March 1966.

The competitive tonnage area of the internal rail transportation of goods, which excluded the transportation of coal and coke from Wankie, amounted to 1,920,751 tons or 13.02% of the total rail tonnages transported.

The total internal rail transportation of goods amounted to 2,825,281 tons, whilst the overall total was 14,757,000 tons. Coal and coke transportation by rail from Wankie amounted to 904,530 tons.

$(2,825,281 - 904,530) \text{ tons} = 1,920,751 \text{ tons}$

$$\frac{1,920,751}{14,757,000} \times 100 = 13.02\%$$

The competitive tonnage of 1,920,751 tons amounted to an output of approximately 351 million ton-miles, or 5.94% of the total ton-miles transported by rail.

The total internal rail transportation output was 724 million ton-miles, whilst the internal transportation of coal and coke from Wankie represented an output of approximately 373 million ton-miles (See Annexure 10 page A143)

From the above analysis it was found that the internal transportation of goods represented a significant part (13.02%) of the total goods tonnage transported by rail, whilst in terms of total ton-miles it was less significant, viz., only 5.94%

8.3. Analysis of short distance movements by the Railways:

An analysis was made of the internal transportation of goods over short distances by the Railways for 1965.

Of the total internal tonnage of goods transported 627,819 tons or 28.25% of the total internal tonnages were carried over distances of less than 100 miles. The total net ton-miles resulting from the transportation of goods over distances of less than 100 miles came to 35,397,929 ton-miles, or 4.89% of the total internal ton-miles (724 million). (Refer Annexure 11 page A158).

In comparison with the overall total for the Railways, viz, 14,757,000 tons and 5,888 million ton-miles, the internal transportation of goods over distances of less than 100 miles seems relatively insignificant, viz, tonnage and ton-mile percentages of 4.25 and 0.6 respectively.

(From the data in Annexure 10 pages A97 to A154 all tonnages and ton-miles relative to goods transported over distances of less than 100 miles were extracted and summarized in Annexure 11, page A158).

In chapter 7 the break-even calculation between rail and road transportation indicated that the average cost of transportation for road was less than that for rail below distances of 80 miles, or say even below 100 miles, which is considered to be the upper limit of the break-even critical range..

Based on this calculation, it would seem only logical to attempt to divert future "short distance" transportation from rail to road, even more so since it was pointed out that the "short distance" transportation of goods by rail in any event represented a relatively insignificant part of the total goods transported by the Railways. For this reason the diversion of short distance transportation would not have a significant effect on the total profitability of the Railways, the more so as the costs of short distance transportation are relatively higher than the costs over long distances. The diversion of short distance transportation would also lead to a reduction in the already high terminal costs associated with railway operations.

This diversion would be of significant advantage to the users of transportation capacities, since a door-to-door delivery would become possible and transportation time would also be reduced.

Public Service Hauliers should benefit substantially from the diversion, not only as a result of their lower than rail costs over short distances but also as a result of the significance of the tonnages involved in relation to their existing transportation tonnages.

8.4. The relative importance of internal goods transportation to Public Service Hauliers:

As in the case of the Railways an attempt was made to establish relative volumes transported by the Public Service Hauliers.

The Road Service Board in Salisbury provided a schedule of Public Service vehicles in operation as at the 14th December, 1966. It was, however, not possible to determine the nett carrying capacity of these vehicles since the same vehicles were in certain instances permitted to operate on different routes or in different areas.

The following effort to establish the nett permit capacity of Public Service Haulier vehicles which were in direct competition with the Railways should provide a fair basis for determining the magnitude of their competition.

The total permit capacity for Public Service Haulier vehicles amounted to 31,045 tons as at 14th December, 1966. (Figures for 1965 did not differ significantly from those for 1966).

The Road Service Board also reported the following number of Public Service Haulier vehicles which could carry goods:-

Goods vehicles	=	1354
Independent trailers	=	296
Articulated trailers	=	<u>632</u>
Total goods vehicles	=	<u>2282</u>

Based on a conservative 8.5 tons per vehicle the total carrying capacity for 2282 vehicles can be estimated at approximately 19,400 tons.

The nett capacity tons expressed as a percentage of permit capacity tons equals 62.5%.

$$\frac{(19,400 \times 100)}{31,045} = 62.5\%$$

This percentage was used as a basis for determining the estimated nett carrying capacity of Public Service Haulier vehicles in competition with the Railways.

The list of permits provided by the Road Service Board was analysed and it was found that 6,132 permit-tons were in competition with the Railways.

These permits related to those granted for the carrying of general goods throughout Rhodesia, plus route permits where the Railways provide a rail transportation service. Radius permits were ignored, although 50 mile and higher radius permits could result in competition with the Railways for straight line distances up to 100 miles.

Applying the percentage of 62.6% calculated above to the 6,132 permit-tons, a nett carrying capacity of 3,825 tons was derived, say, 3,800 tons.

As a result of the lack of exact information as regards the actual competition of the Public Service Hauliers with the Railways, it was necessary to rely on an estimate of the tonnages carried and of the relative ton-miles involved in this transportation. It should be clearly noted that the purpose of this estimate was only to establish the order of magnitude of the competition and to determine whether competition was in fact of significance.

Based on the assumption that a nett payload of 80% was achieved, it was roughly estimated that 3040 tons (80% of 3,800) of goods could have been moved in a single day. Based on 5½ working days per week, giving 286 days per year, the total tonnage transported would have amounted to 869,440 tons per annum.

It was established that the average mileage of Public Haulier vehicles in 1965 was approximately 80 miles per day. This means that up to 50% of the above tonnage transportation could have been over distances greater than 80 miles. Assuming that a conservative 25% of the above tonnage was in fact transported over distances greater than 80 miles, an estimated competitive annual tonnage of 217,000 tons was derived.

If the above estimated annual tonnage is compared with the long distance internal railway goods transportation figure of 1.3 million ⁱ⁾ tons (excluding rail transportation over short distances), it is obvious that the long distance haulage competition from road was significant.

- i) $(1,920,751 - 627,819) = \pm 1.3$ million tons
Refer paragraphs 8.2 and 8.3 above.)

In relation to data which were obtained from 37 Public Service Hauliers on total tonnages transported by them during 1965 and 1966, the competitive annual tonnage estimated above seems reasonable. These hauliers reported transporting 1,950,121 tons of goods during 1965 and 2,137,903 tons during 1966. (Refer Annexure 6 page A74).

8.5. Competition between rail and long distance road transportation:

It was essential that an attempt be made to establish the magnitude of the competition experienced by the Railways, specifically from Public Service Hauliers transporting goods over long distances.

An agreement exists between the Railways and members of the Long Distance Road Transport Operator's Association which covers the long distance haulage of certain high tariff goods over defined routes.

In terms of this agreement the members of the Association undertake:

- i. to limit their licensed capacity on the scheduled routes;
- ii. not to charge less than the corresponding rail rates prevailing from time to time on the scheduled routes in respect of scheduled traffic;

- iii. not to encourage interception of goods from outside the territories;
- iv. to advise the Railways at the time of the annual census (October) on the total tonnage moved during the preceding year.

The main purpose of the agreement is to control the competition which is experienced by the Railways from these long distance road hauliers. It must be assumed that given the tonnages and vehicle capacities allowed in accordance with this agreement, the agreement must be successful in terms of its general aims.

As regards tariffs the agreement states that not less than the railway tariff will be charged by these hauliers. It could be assumed that they, in effect, charge the railway tariffs.

The break-even calculations between rail and road transportation indicated that the average cost of transportation for road was higher than that for rail for distances greater than 80 miles.

Since in terms of the above-mentioned agreement road tariffs are not higher than rail tariffs, it must be concluded that unfair competition must exist in terms of the supplier's transportation costs.

(Refer chapter 3 for a discussion of the effects of tariffs which do not reflect the transportation costs of alternative transportation media).

The question which arises is whether the agreement can be justified.

In terms of the basic requirements for a sound long-term policy the agreement is not justifiable. The reason for this is that because of the agreement the tariffs charged by road hauliers do not reflect their respective transportation costs. Furthermore, the user's freedom of choice is impaired by the road transportation capacity which is imposed on the long distance hauliers by the agreement.

It is possible that if tariffs were introduced which reflect the supplier's costs an even greater road transportation capacity could result from the user's freedom of choice and from the effects of "other user costs".
(Refer chapter 3).

From the point of view of the costs of the transportation supplier, rail transportation has the advantage over road transportation over distances greater than 80 miles.

It is essential, therefore, that an estimate be made of the magnitude of the total long distance tonnage which could be diverted from road to rail and also of the possible saving which would be involved if traffic were diverted.

8.6. The possible magnitude of long distance tonnage which could be diverted from road to rail:

The following long distance tonnages of goods were transported by the Railways and Public Service Hauliers during October 1965 over the indicated routes in the table given below.

It should be noted that intermediate traffic on these routes was not included in the table. Intermediate traffic refers to the transportation of goods which do not initiate and terminate at the centres at the extreme ends of the routes concerned.

Table: Long distance haulage of goods over specified routes
in terms of the Rail/Road Agreement for 1965:

Route no.	Indicated routes		Tonnes transported October 1965	
	From	To	Rail	Road
1A	Umtali	Salisbury	388	1339
1B	Umtali	Bulawayo	258	232
2A	Salisbury	Umtali	966	1418
2B	Salisbury	Bulawayo	829	2405
3A	Bulawayo	Umtali	118	194
3B	Bulawayo	Salisbury	574	2503
		Total:	3133	8091

(Source - Road/Rail Agreement - Annual Census
of October 1965 - Rhodesia Railways internal
document).

Table: Calculated annual tons and ton-miles:

Route no.	Calculated annual tons		Rail miles	Calculated ton-miles	
	Rail	Road		Rail	Road
1A	4656	16068	170	791520	2731560
1B	3096	2784	472	1461312	1314048
2A	11592	17016	170	1970640	2892720
2B	9948	28860	302	3004296	8715720
3A	1416	2328	472	668352	1098816
3B	6888	30036	302	2080176	9070872
Total:	37596	97092 = 100,000 approx.		9976296 = 10,000,000 approx.	25823736 = 26,000,000 approx.

The weighted average distance of these routes is 259 miles per ton.

The above data represent only the Rhodesia internal transportation portion of the agreement.

By diverting the above long distance road haulage tonnage to rail transportation the Railways would have procured up to approximately 100,000 tons of long distance transportation of goods during 1965, representing almost 26 million ton-miles of long distance haulage.

It is interesting to note that the above 100,000 tons which was the actual transportation of goods over the indicated routes represents 46% of the estimated total long distance tonnage (217,000 tons) calculated in paragraph 8.4 above.

In terms of both tonnages transported and ton-miles the total road transportation of goods exceeded the total rail transportation over the indicated routes. (97092 tons as opposed to 37,597 tons, and $\pm$ 26 million as opposed to $\pm$ 10 million ton-miles).

In paragraph 8.3 it was established that of the total internal tonnage of goods transported by the Railways, 627,819 tons were carried over distances of less than 100 miles and, therefore, could have been diverted from rail to road. The average rail distance over which these goods were carried was 56.38 miles (Refer Annexure 11 page A158).

Based on the average rail cost information provided in chapter 7, viz., a fixed/terminal cost per ton of 254.73d and a variable cost per ton-mile of 1.2061d, total rail costs were determined by using the following cost equations:-

$$X = F.Q. + V.M. \dots (\text{Equation A.})$$

Where:

- X = Total rail cost in respect of short distance tonnages.
- F = Fixed average terminal cost per ton.
- Q = Total tons transported over short distances.
- V = Average variable cost per ton-mile.
- M = Average transportation mileage for 1 ton of goods.

Substituting the relative values above in the equation the total rail cost of the traffic diversion which could have been avoided comes to:

$$\begin{aligned} X &= (254.73^d \times 627,819) + (1.2061^d \times 627,819 \times 56.38) \\ &= £666,351 + £177,882 \\ &= £844,233 \end{aligned}$$

This cost could be regarded as the possible saving in cost which the Railways could have made if short distance traffic had been diverted to road transportation. It is interesting to note that the fixed terminal cost per ton represents the largest part of the £844,233 which could have been avoided.

Assuming that this short distance rail tonnage (i.e. 627,819 tons) was transported by Public Service Hauliers who normally operate over long distances, the total transportation costs can be calculated by using the unit cost information provided in chapter 7 paragraph 7.3.2. In respect of the 5 largest haulier firms the average fixed cost per ton was 139^d and the average variable cost per ton-mile 2.88^d .

The following formula can be used to determine the total road transportation cost:-

$$Y = F.Q. + V.Q.M. \dots\dots\dots (\text{Equation B}).$$

Where

- Y = Total road transportation cost had the diverted tonnage been transported by road.
- F = Average fixed cost per ton.
- Q = Total tons which could have been transported by road.
- V = Average variable cost per ton-mile.
- M = Average transportation mileage for 1 ton of goods.

Substituting the relative values in this equation. the total road transportation cost, had the tonnage been diverted to road, comes to:-

$$\begin{aligned} Y &= (139^d \times 627,819) + (2.88^d \times 627,819 \times 56.38) \\ &= \text{£}363,612 + \text{£}424,757 \\ &= \text{£}788,369 \end{aligned}$$

The difference between the total rail transportation cost and total road transportation cost of transporting the 627,819 tons of goods is R55,864. Had these goods been diverted from rail to road a saving of R55,864 could have been effected.

Road to rail diversion:

Two calculations were made to determine the possible saving in cost if long distance traffic had been diverted from road to rail, viz., in respect of:

- i. the 100,000 tons per annum which could have been diverted if the long distance agreement had not been in effect, (Refer paragraph 8.6).
- ii. the balance of the estimated annual tonnage of 217,000 tons i.e. 117,000 tons. (Refer paragraph 8.4.)

i. Long distance agreement tonnage:

Using equation A above as a basis for long distance traffic diversion and substituting the relative values in this equation, it was possible to calculate the total rail transportation cost had the diverted tonnage been transported by rail.

$$X = F.Q. + V.Q.M.$$

where $F = 254.73^d$

$$Q = 100,000 \text{ tons}$$

$$V = 1.2061^d$$

$$M = 259 \text{ miles (Refer paragraph 8.6 above).}$$

$$X = (254.73^d \times 100,000) + (1.2061^d \times 100,000 \times 259)$$

$$= £106,138 + £130,158$$

$$= £236,296$$

By using equation B above and substituting the relative values in this equation, the total road transportation cost which could have been avoided had the tonnages been transported by rail, was calculated.

$$Y = F.Q. + V.Q.M.$$

where $F = 139^d$

$$Q = 100,000 \text{ tons}$$

$$V = 2.88^d$$

$$M = 259 \text{ miles}$$

$$\begin{aligned} Y &= (139^d \times 100,000) + (2.88^d \times 100,000 \times 259) \\ &= £57,916 + £310,800 \\ &= £368,716 \end{aligned}$$

The difference in costs representing a transportation cost saving for the transportation of the diverted 100,000 tons comes to £132,420 (i.e. £368,716 - £236,296).

ii. Balance of tonnage: i.e. estimated 117,000 tons.

By using equation A above and substituting the following values, total rail costs were calculated:-

$$F = 254.73^d$$

$$Q = 117,000 \text{ tons}$$

$$V = 1.2061^d$$

$$M = 125 \text{ miles (conservative estimate only)}$$

$$X = F.Q. + V.Q.M.$$

$$\begin{aligned} X &= (254.73^d \times 117,000) + \\ &\quad (1.2061^d \times 117,000 \times 125) \\ &= £124,181 + £73,497 \\ &= £197,678 \end{aligned}$$

By using equation B above and substituting the following values, the total road transportation cost was calculated:-

$$F = 139^d$$

$$Q = 117,000 \text{ tons}$$

$$M = 125 \text{ miles}$$

$$V = 2.88^d$$

$$Y = F.Q. + V.Q.M.$$

$$Y = (139^d \times 117,000) + (2.88^d \times 117,000 \times 125)$$

$$= \text{£}67,762 \quad + \quad \text{£}175,500$$

$$= \text{£}243,262$$

The difference in costs representing a transportation cost saving for the transportation of the diverted 117,000 tons comes to £45,584 (i.e. £243,262 - £197,678).

Summary of cost savings which could have been effected had traffic been diverted:

The following table provides a summary of cost savings which could have been effected had traffic been diverted from rail to road for distances up to 100 miles and from road to rail for distances over 100 miles.

Diversion from	Tonnage	Total rail cost	Total road cost	Saving
Rail to road (Actual)	627,819	£844,233	£788,369	£ 55,864
Road to rail (Actual)	100,000	£236,296	£368,716	£132,420
Road to rail (Balance estimate)	117,000	£197,678	£243,262	£ 45,584
Estimated total saving in transportation cost =				£233,868

8.7. Conclusions:

The estimated total saving of £233,868 in transportation costs which could have been effected during 1965 if short distance goods traffic had been diverted from rail to road and long distance goods traffic from road to rail should only be regarded as an indication of the possible magnitude of the savings which could result from the diversion of traffic.

The estimate is considered to be a conservative one and should be seen as an indication of the uneconomic utilization of scarce resources which results from a transportation policy which allows tariffs which do not reflect the costs of alternative transportation media.

PART IV - SUMMARY

A summary of the purpose, method
of approach and recommendations
is given.

CHAPTER 9

SUMMARY AND RECOMMENDATIONS

9.1. Purpose and method of approach:

The basic objective of this study was directed at developing an approach for a long-term transportation policy which could lead to a maximum goods transportation industry in Rhodesia, in which the various transportation suppliers make the most economical use of the scarce resources at their disposal.

The primary factors considered are the organizational structure required for the planning, control and co-ordination of the transportation industry, the cost of transportation and its significance in the development of a long-term policy and interim measures which could be adopted whilst working towards the long-term transportation policy.

The three principal criteria for a long-term transportation policy are tariffs which reflect both rail and road transportation costs, the transportation user's freedom of choice and equal competitive opportunities for the transportation suppliers.

Since the introduction of the long-term transportation policy is dependent on the determination of transportation costs and the present costing system of the Rhodesia Railways does not make provision for costing on a goods transportation basis, an approach is developed which could be used by the Railways to determine transportation costs in respect of different goods or categories of goods. In principle this approach which is based on the density of the goods subject to transportation results in the determination of various levels of variable transportation costs per ton-mile and various levels of fixed terminal costs, per ton.

A similar approach for the determination of the cost of road transportation of goods is also developed. These approaches would lead to comparative costs for the rail and road transportation of goods. The use of the technique of cost break-even analysis for the purpose of effecting comparisons between the costs of alternative transportation media is illustrated. The break-even technique could also form a useful tool for establishing tariffs which reflect the costs of the alternative transportation media.

In order to carry out effectively the functions relative to the planning, control and co-ordination of the transportation industry, it is essential that factual information be available to the Government. A "transportation intelligence system" is developed which could be used to collect factual

information relative to the demand for and supply of transportation capacities. A simple transportation model based on hypothetical details is constructed to illustrate the basic information which would be required by such a system. Practical difficulties which could arise are also dealt with. The system makes provision for both the collection of historical information and the use of estimates in relation to the future demand for transportation. The use of goods-flow tables which give the movement of goods between supply and demand areas is also illustrated.

Since the long-term transportation policy cannot be put into effect overnight, interim measures which in the meanwhile would yield economic and other benefits whilst working towards the long-term policy should be introduced. In principle the interim measures which are recommended are that rail and road transportation be temporarily restricted to those distances over which they can operate most economically. Since the costs of transporting specific goods or categories of goods have as yet not been determined for either rail or road transportation, average transportation costs are used to compare the costs of the alternative mediums. Based on average costs, break-even analyses between rail and Public Service Haulier road transportation indicate that on a national average basis rail transportation of goods becomes more economical than road transport after 80 miles, and vice versa. This break-even distance of 80 miles is used as the basis on which interim measures are formulated in respect of rail and road transportation competition. Interim measures are recommended in respect of the Railways, Public Service Hauliers and own account transport operators.

An attempt is made to assess the possible effects of diverting goods transportation from road to rail, and vice versa. Based on figures for 1965 an estimated total saving of £233,865 could have been effected during 1965 if short distance goods traffic had been diverted from rail to road and long distance goods traffic from road to rail.

9.2. Recommendations:

9.2.1. Organizational structure:

It is recommended that an organizational structure which makes provision for a Transportation Advisory Council and a Transportation Planning and Co-ordination Board be created to assist the ministries concerned with transportation in their respective tasks. The Transportation Advisory Council should act as an advisory body to the Minister on any matters concerning transportation in Rhodesia. The basic objective of the Transportation Planning and Co-ordination Board should be to assist the Minister with transportation policy decisions which are motivated by the optimization of the performance of the transportation industry in relation to the supply of and demand for transportation capacity, the cost of and the investment in the transportation industry. The appointment of a transportation research economist who would be a member of the Advisory Council, the Planning and Co-ordination Board and the existing Road Service Board is also recommended.

9.2.2. Long-term transportation policy:

It is recommended that Rhodesia should work towards a long-term transportation policy in which tariffs of alternative goods transportation media should be made to reflect the supplier's total costs, the transportation user is given a freedom of choice of transportation media and transportation suppliers are afforded equal treatment as regards competition.

9.2.3. Interim measures:

In principle it is recommended that short distance goods traffic be diverted from rail to road and long distance goods traffic from road to rail.

9.2.3.1. Public Service Hauliers:

It is suggested that Rhodesia be divided into controlled and uncontrolled areas for the purpose of introducing transportation restrictions. Controlled areas with a radius of 40 miles should be situated around railway lines and should have as central points towns situated on these railway lines. Public Service Hauliers who are in possession of existing radius permits should qualify for the new proposed 40 mile radius permits, which in principle would restrict their competition with the Railways to within the boundaries of the controlled areas. Public Service Hauliers in possession of existing open and route permits should be allowed to retain these permits. Long distance transportation levies should be imposed to compensate the Railways for any lost traffic. Certain exceptions would have to be made with regard to the transportation of goods over long distances.

9.2.3.2. Own account transportation suppliers:

Own account transportation suppliers are not permitted to transport goods on a hire or reward basis. It is recommended that a radius restriction of 20 miles be placed on commercial and industrial transportation vehicles in controlled areas. Special permits could be granted for carrying goods over distances greater than those imposed by the 20 mile radius restriction. Long distance levies could be introduced whenever these special permits are issued.

Farmer syndicates should be subjected to the same radius restrictions as Public Service Hauliers and should be granted special permits to carry agricultural products and requirements only. Certain exceptions would have to be made for fresh farm products. Farmers' co-operative societies should in principle be subjected to the 20 mile radius restrictions imposed on commerce and industry. Individual farmers should be allowed freedom of movement as regards their own transport.

The mining industry should be allowed to use their own transportation freely to transport any requirements or products to the nearest principal towns, in instances where they are not situated near railheads. Other private goods vehicles should be restricted to a 20 mile radius in the controlled areas where they may only operate on an own account basis.

The implementation of the proposed interim measures should be done in four stages. In order to enforce the various interim measures adequately, various forms of control should be introduced such as vehicle identification and permit control, piracy control, etc.

9.3. Conclusion:

The introduction of a long-term transportation policy for Rhodesia which is based on the principles of tariffs which reflect the cost of the transportation of various goods or categories of goods transported by alternative means of transport, user's freedom of choice and equal treatment of suppliers should yield a maximum goods transportation industry in which maximum utilization would be made of the scarce resources available to the various competitors in the transportation industry. By introducing interim measures whilst working towards this ultimate transportation policy Rhodesia would in the meanwhile be able to reap certain economic and other benefits.

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SUMMARIES

1. Afrikaans
2. English
3. German

OPSOMMING

Die doel van hierdie studie was om 'n raamwerk te ontwikkel vir 'n langtermyn-vervoerbeleid wat aanleiding kan gee tot 'n maksimale goedere-vervoerindustrie in Rhodesië, waarin die mededingende vervoerleweransiers die mees ekonomiese benutting van beskikbare skaars produksie-faktore maak.

Die primêre faktore wat in hierdie studie in ag geneem is, is

- a. die organisatoriese struktuur wat nodig geag word om die vervoerindustrie te koördineer en te lei na 'n „maksimale” industrie;
- b. die koste van goedere-vervoer soos gesien van die kant van die betrokke mededingende vervoer-media, naamlik, pad en spoorvervoer, asook van die kant van die verbruiker van die vervoer-media;
- c. enige tussentydse maatreëls wat geneem moet word ten einde vordering te maak in die rigting van die langtermyn-beleid.

Daar word aanbeveel dat 'n Vervoer-Adviesraad en 'n Vervoer-Koördinasie- en Beplanningsraad in die lewe geroep word om die betrokke minister van advies te bedien en hom behulpzaam te wees met die opstel en uitvoering van die langtermyn-beleid.

Die basiese beginsels wat neergelê word vir 'n langtermyn-vervoerbeleid is:-

- i. vervoer-tariewe wat die koste van alternatiewe vervoermiddels reflekteer ten opsigte van verskeie goedere, of kategorieë van goedere;
- ii. die handhawing van die verbruiker van vervoer-dienste se vryheid van keuse ten einde hom in staat te stel om 'n optimale keuse in terme van koste tussen die alternatiewes te maak, en
- iii. gelyke kompetisie-kanse vir die vervoer-leweransiers.

Aangesien inligting ten opsigte van die vervoerkoste van spesifieke goedere of kategorieë van goedere vir nog spoor- nog padvervoer in Rhodesië beskikbaar is, is 'n metode ontwikkel wat aangewend kan word om wel vervoerkoste op 'n goedere-basis te kan bereken. Aandag word ook geskenk aan 'n inligtings-stelsel wat benut kan word om kwantitatiewe inligting te versamel, ten opsigte van die aanvraag na alternatiewe vervoermiddels en die aanbod van beskikbare vervoerkapasiteite. Hierdie inligting kan benut word vir doeleindes van vervoer-beplanning, -beheer-en-koördinasie.

Die tussentydse maatreëls wat aanbeveel word, kom daarop neer dat die spoor- en padvervoer tydelik beperk word tot daardie afstande waar hulle op basis van gemiddelde koste op die mees ekonomiese wyse kan funksioneer, naamlik spoorvervoer tot afstande bo 80 myl en padvervoer tot afstande korter as 80 myl. Die verbruiker se keuse word nie hierdeur omvergewerp nie, aangesien aanbeveel word dat padvervoer nogtans oor afstande van meer as 80 myl kan plaasvind, onderhewig aan die betaling van 'n langafstands-padvervoer-heffing.

SUMMARY

The objective of this study is directed at developing an approach for a long-term transportation policy which could lead to a maximum goods transportation industry in Rhodesia in which the competitive suppliers of transportation make the most economical use of the scarce resources at their disposal.

The primary factors considered are:

- a. the organizational structure required to co-ordinate the transportation industry and guide it towards a maximum industry;
- b. the cost of goods transportation as seen from the points of view of both the competitive transportation media, viz., road and rail transportation, as well as from that of the user of the transportation media;
- c. interim measures which should be introduced in order to work towards the long-term policy.

It is recommended that a Transportation Advisory Council and a Transportation Planning and Co-ordination Board be created to advise the minister concerned and assist him in planning and carrying out the long-term policy.

- The basic principles which are laid down for a long-term transportation policy are:-

- i. transportation tariffs which reflect the costs of alternative transportation media in respect of various goods or categories of goods;
- ii. the upholding of the user's freedom of choice in order that he may make an optimal decision in terms of the costs of the alternative transportation media; and
- iii. equal competitive opportunities for the transportation suppliers.

Since information relative to the transportation costs of specific goods or categories of goods is not available for either rail or road transportation in Rhodesia, a method is developed which could be used to determine transportation costs on a goods basis. Attention is also given to an information system which could be used for the collection of quantitative information relative to the demand for alternative transportation media and the supply of available transportation capacities. This information could be used for the purpose of transportation planning, control and co-ordination.

The interim measures which are recommended are basically that rail and road transportation be temporarily restricted to those distances over which they can operate most economically on the basis of average costs, viz., rail transportation to distances greater than 80 miles and road transportation to distances less than 80 miles. The user's freedom of choice is not affected by this since it is recommended that road transportation still be allowed for distances greater than 80 miles subject to the payment of a long distance road transportation levy.

ZUSAMMENFASSUNG

Zweck dieser Untersuchung war die Entwicklung der Grundlagen einer langfristigen Transportpolitik zur Förderung einer optimalisierten Güterverkehrsindustrie in Rhodesien, damit die konkurrierenden Transportdienste die wirtschaftlichste Nutzung der vorhandenen knappen Produktionsfaktoren ermöglichen.

In der vorliegenden Untersuchung wurden die folgenden grundsätzlichen Faktoren berücksichtigt:

- a. Der Verwaltungsapparat der zur Koordination der Güterverkehrsindustrie und zur Optimalisierung der Industrie für erforderlich gehalten wird;
- b. die Kosten des Güterverkehrs aus der Warte der betreffenden konkurrierenden Transportmittel, d.h. Strassen- und Eisenbahnverkehr als auch aus der Warte des Benutzers der Verkehrsmittel.
- c. Etwaige Übergangsmassnahmen, die zur Entwicklung auf eine langfristige Politik hin für notwendig erachtet werden.

Es wird die Gründung eines beratenden Transportgremiums und eines Gremiums zur Transportkoordination und Planung zwecks Beratung und Unterstützung des verantwortlichen Ministers im Rahmen der Formulierung und Durchführung der langfristigen Politik vorgeschlagen.

Die folgenden Vorschläge sollen als Grundlage einer langfristigen Transportpolitik dienen:

1. Güterverkehrsgebührenordnungen, die im Verhältnis zu den Kosten der Transportmittelalternativen für die verschiedensten Güter und Güterklassen stehen.

- ii. es soll dem Verbraucher der Transportdienste völlige Entscheidungsfreiheit überlassen werden, damit er selbst nach Berücksichtigung sämtlicher Kostenfaktoren, die für ihn günstigste Wahl zwischen den Alternativen treffen kann und
- iii. ausgeglichene Konkurrenzmöglichkeiten zwischen den verschiedenen Transportdiensten;

Da es in Rhodesien an Einzelheiten bezüglich der Transportunkosten der verschiedensten Güter bzw. Güterklassen sowohl im Eisenbahn- als auch im Strassenverkehr fehlt, wurde ein Verfahren entwickelt, wonach die Berechnung der Transportkosten auf Grundlage der Güter möglich ist. Es wird auch ein Informationssystem zur Sammlung quantitativer Daten, hinsichtlich Nachfrage nach den einzelnen Verkehrsmittelarten und Angebot verfügbarer Transportkapazitäten in Betracht gezogen. Diese Daten können dann zur Planung, Kontrolle und Koordination des Verkehrssystems nutzbar gemacht werden.

Die vorgeschlagenen Übergangsmassnahmen bestehen im wesentlichen darin, dass die Wahlfreiheit zwischen Eisenbahn- und Strassen-transport vorläufig in entfernungsabhängiger Weise eingeschränkt wird und zwar so, dass im Durchschnitt der wirtschaftlichste Betrieb gewährleistet wird, wobei der Eisenbahnverkehr für Entfernungen von mehr als 80 Meilen und der Strassenverkehr für Entfernungen von weniger als 80 Meilen dienen soll. Die Entscheidungsfreiheit des Benutzers soll jedoch insofern erhalten bleiben, als vorschlagsgemäss der Strassentransport auch über grössere Entfernungen als 80 Meilen stattfinden darf, wobei jedoch eine Sondergebühr für Fernverkehrsstrassentransport erhoben werden soll.

ANNEXURES

ANNEXURE 1

- i. Memorandum submitted by the Association of Rhodesian Industries (page A2)
- ii. Comments (page A17)

SURVEY OF RHODESIAN TRANSPORT

Memorandum by the Association of Rhodesian Industries:

INTRODUCTION:

1. The Association of Rhodesian Industries has studied the terms of reference for a survey of Rhodesian transport agreed upon between the Minister of Transport and Messrs. Associated Industrial Consultants (Pty) Ltd., as set out in a letter from the Commissioner of Roads and Road Traffic to the Secretary of A.Rn.I., dated 14th April, 1967, and wishes to submit the following comments.
2. The Association wishes first of all to record that it would have preferred to have had rather more time than has been made available to it to allow for a proper and full consideration of this very important subject and the following memorandum must therefore be regarded more in the nature of provisional comment, rather than a comprehensive and final report of A.Rn.I.'s views on this matter.

PURPOSE AND SCOPE OF THE SURVEY:

3. A.Rn.I. finds considerable difficulty, on the basis of the letter referred to above, in determining precisely what the scope and nature of the proposed transport survey really is. It appears from the initial proposal submitted to the Consultants by the Ministry that the prime purpose of the survey was to examine in full the present structure of road motor transport in Rhodesia and to make recommendations on ways in which road motor transportation could be employed to the greatest public advantage. From the Consultants' terms of reference, however, which were subsequently accepted by the Ministry, it appears that other forms of transport, notably rail transport, are now also to be included in the survey. It is the view of A.Rn.I. that all forms of

transport, including road, rail and air transport, and all types of traffic, including passenger, need to be covered by the survey if a proper examination of Rhodesian transportation as a whole is to be made. It is the considered view of A.Rn.I. that it is impossible to make recommendations on a future transport policy, either in whole or in part which, it is noted, is one of the proposals put forward by the Consultants, unless all forms of transportation are included.

4. A.Rn.I. notes with some concern the emphasis in the Ministry's proposed terms of reference on the regulation, control, functioning and co-ordination of road motor transport. In the Association's view such proposals will not necessarily result in the greatest public advantage if they restrict the operation of road transport vis-a-vis the Railways further than exists at the present time. Indeed, it is the Association's view that even the present system of regulations and controls on the operation of road transport are not conducive to the greatest public advantage as this would be defined by A.Rn.I.
5. In the same way as A.Rn.I. would view with concern any attempt to restrict the operation in toto of road transport services because of the effect that they were having on the operation of the Railways system, so too would A.Rn.I. be opposed to any further unfair restrictions being placed either upon the operation of private road hauliers, or upon the legitimate use of other private motor transport, for the benefit of the Road Motor Services operated by the Railways. It follows from this that A.Rn.I. would not be in favour of any attempt to nationalise privately operated road transport on the grounds of allegedly achieving better regulation, control, functioning and co-ordination. A.Rn.I. can see no necessity, on the evidence provided, for attempting to define by regulation such questions as "the spheres of operation for various classes of motor transport" and considers that such spheres of operation should arise naturally as a result of such considerations as the cost of movement and the type and efficiency of service provided.

6. In A.Rn.I.'s view the proper starting point for any survey of this nature would be the principles on which the country's transport system should be based and this would necessitate, for example, a re-examination of the terms of the Rhodesia Railways Act and of the relative positions of road and rail traffic and of the RMS vis-a-vis privately operated transport.
7. A.Rn.I. therefore submits for consideration the following memorandum incorporating the above points and setting out the general principles which A.Rn.I. considers must be taken into account if any worthwhile investigation of the country's transport system is to be undertaken.
8. It is appreciated by the Association that what is being proposed is a much broader survey of transport within the country than appears to be contemplated, certainly in the original terms of reference submitted to the Consultants, but as has been stressed above, it is A.Rn.I.'s view that it is impossible to consider one aspect of the transport system in isolation. This fact appears to have been acknowledged in the terms of reference proposed by the Consultants. But even here, A.Rn.I. considers that the terms of reference may not be sufficiently broad to include an examination of the sort of questions which need to be examined if this very vital sector of the country's economy is to be employed to the greatest public advantage as proposed in the Ministry's terms of reference.

GENERAL PRINCIPLES WHICH A.Rn.I. CONSIDERS SHOULD BE SET OUT FOR THE SURVEY:

9. A.Rn.I. considers that it is in the interests of both the country as a whole and the industrial sector in particular, that capital investment in the transport sector should, in general, be made where it will yield the maximum return, that is, where it will give the best possible service with the minimum of expenditure. The only exceptions to this rule being, in A.Rn.I.'s view, where transport facilities are provided by the State either as an uneconomic service on social grounds or as an aid to the development of resources which would otherwise remain unexploited, or where the transport system provided by private enterprise is considered to be operated contrary to the national interest. A.Rn.I. considers the comparative roles of the State and private enterprise in the field of transport as essentially complementary with the State providing only those services which, for various reasons, private enterprise is unable, or unwilling, to provide. Any departure from this policy would need to be justified on the grounds of overall national interest. The costs of such a departure would also have to be taken into account and should, like the overall cost of State transport, be borne by the taxpayer and not just by the direct users of transport.
10. It follows from this principle that it is that form of transport providing the required service at the lowest possible cost which, in the Association's view, should be allowed to develop to the maximum possible extent. Any regulation or administrative arrangements which prevent the development of the most competitive form of transport are not, in the Association's view, in the best long term economic interests of the country. In any conflict of criteria, minimum cost must be the deciding factor.

11. It is A.Rn.I.'s view that, although in the past, capital investment in the transport system of Rhodesia has been predominantly in the Railways, this is not necessarily a valid reason for continued investment in the Railways in future. It is the view of the Association that further investment in the Railways system needs, subject to the qualification mentioned in paragraph 9 above, to be justified on economic grounds alone. That is, that it requires to be shown that investment in the Railways will produce a service for industry and the country at large at a cost which will either not otherwise be provided or which cannot be matched by any other form of transport.
12. It is recognised that the acceptance of a principle such as this implies a radical departure from past policy and that were such a principle to be accepted by Government, changes in the structure of the existing transport system would need to be introduced gradually and with safeguards to prevent unnecessary duplication of investment, substantial unemployment and a reduction, either in quality or quantity, in the services presently available. Nevertheless, if the economy of the country is to develop and diversify to the fullest possible extent, it is of the utmost importance that transport costs be kept to an absolute minimum and this can be achieved only if the country is permitted to develop the most efficient (i.e. the cheapest) form of transport available to it. It is, in the view of A.Rn.I., also of considerable importance to avoid the investment of public funds in those sectors of the economy where private enterprise is willing and able to provide the necessary capital, on the grounds of making the optimum use of the scarce capital resources available for investment.
13. It should be stressed that what is proposed as a general principle does not imply, per se, the closure of the Railway system of the country and its replacement by some other form or forms of transportation. Indeed, as has already been indicated, A.Rn.I. recognises that there is a need for the State to establish and operate transport services in the national interest, that is, where no other services are, or will be, made available by private enterprise, or where future economic development is to be promoted, or where the service

provided by private enterprise is regarded as inadequate. What it does imply, however, is that the Railways system is required to demonstrate that private enterprise cannot provide the required service or, where privately operated transport is, or could be, made available, that the Railways are the most efficient form of transportation available to the country and the one therefore in which future capital investment can be made to the best national advantage.

14. One further and more minor point on the terms of reference which A.Rn.I. feels needs to be made is that they should embrace air transport and the carriage of passengers (e.g. the movement of factory workers to and from their places of employment). The view of A.Rn.I. is that all aspects of transport must be included in the survey before any worthwhile formulation of policy can be made either overall or in relation to any specific aspect or sector of the country's transport system.

THE EXTENT TO WHICH, IN A.Rn.I.'s VIEW, THE EXISTING PATTERN OF TRANSPORTATION IN RHODESIA CONFORMS TO THE GENERAL PRINCIPLES AS SET OUT UNDER PARAGRAPHS 9 AND 10 ABOVE:

15. In the view of A.Rn.I. the present transport system in Rhodesia and the existing statutory and administrative controls which support it, militate against the optimum use of capital in the country's transport industry. The present structure of the country's transport system does not permit of capital investment where it will yield the best results, either from the national or from the sectional point of view of industry. There is no doubt whatever that existing investment in the Railways system is protected against investment in other forms of transport, particularly road transport, notwithstanding the fact that these other forms of transport could, and do, provide a cheaper, better, quicker and more reliable or more specialised service than can be provided by the Railways for certain types of goods.

16. In making these comments, however, the Association points out that lack of most of the necessary background data hardly facilitates an objective appraisal of the situation. For example, while the Railways do not make available figures showing the actual cost per ton mile of the various classes of traffic carried by them on a national, let alone regional basis, an assessment of their economics of operation, either in whole or in part, is virtually impossible as is also any meaningful comparison of their performance vis-a-vis other forms of transport. Even on the basis of the available information, however, certain features of Railways operation such as the relatively high level of wages vis-a-vis Industry require examination.
17. In addition to the cost advantages which are known to apply to the use of road transport, certainly in the case of that traffic which at present bears the higher rates in the Railways Tariff Book, the service provided by the Railways is considered to fall short of that provided by road transport in the following specific instances:
 - a. Road transport in general provides better handling facilities which result in less damage to goods in transit.
 - b. It is held that claims for damages are more promptly dealt with by the Road Hauliers than by the Railways.
18. It is recognised, however, that these sort of complaints against the services provided by the Railways could be rectified by improved efficiency and by the general introduction of more modern methods of handling such as containerisation. Nevertheless, the basic contention that more efficient forms of transportation than the Railways are available at present or could be made available almost immediately for certain types of traffic, if restrictions were not placed in their way, will persist until or unless a proper cost analysis can demonstrate otherwise.

19. On the question of whether or not the Rhodesian transport system provides, or can provide, adequate carrying capacity to meet present or future demands likely to be made upon it, either at a national or regional level, A.Rn.I. has no precise information. In general terms, however, it is felt that with the present reduction in export traffic brought about by sanctions and the impending break-up of the unitary rail system and the consequent transfer of Railways' personnel from Zambia to Rhodesia, there is likely to be adequate capacity on the Railways system within Rhodesia to meet the overall demand for transport now and in the near future. It is noted that the Consultants' report is to include a "goods flow table" and this, presumably, will show whether A.Rn.I.'s assumption here is correct or not.
20. The only qualification which it is felt needs to be made to this view is that while, as things stand at the moment, only a gradual increase, at best, above the existing level of traffic can be foreseen, any rapid or overnight change in the present pattern of Rhodesia's external trading relations could invalidate this assessment.
21. A.Rn.I. does not consider it a practical proposition to attempt to provide full and detailed information for Industry as a whole, or for certain sectors of it, on such questions as the proportion of traffic carried by the various means of transport and the influence of transport costs on the costs of production, distribution or sale of goods within the country or for export. Nor, apart possibly from the first of these, does the Consultants' report appear likely to provide the answers to such questions.

22. Moreover, A.Rn.I. considers that it is necessary to add that the structural analysis which the Consultants propose to undertake appears, at least from the record of agreement on the firm's assignment, to run the possible risk of overlooking those basic economic considerations to which this memorandum has referred above in its comments on the proposed terms of reference for the survey and without a full examination of which much of the proposed study would be superfluous. For example, while an appraisal of the demand for and supply of, transport capacity both present and future, will no doubt be of value, as will also be the Consultants' recommendations on dealing with future transport requirements, this is in no way a substitute for a proper economic evaluation of the development of the country's transport system in the national interest. While the proposed survey may well demonstrate that there is overall, either at the national or at any particular regional level, a surplus of transport capacity, it does not necessarily follow that further investment in the transport industry at that particular level would be undesirable. Depending upon the results of the analysis which the Association will propose of the relative competitiveness of the various forms of transportation, road transport, for example, could be inadequate to meet all the demands made upon it while at the same time the Railways might be in the position of having unutilized capacity. This could lead to the conclusion that any additional demand for transport should be met by the Railways until such surplus capacity was fully utilized. In the view of A.Rn.I. such a "solution" would not necessarily be in the best interests either of Industry or of the country as a whole.
23. Even the existence of surplus capacity in all types of available transport at one and the same time is not necessarily indicative of the ability of the country's transport system to meet the country's requirements to the best advantage. The unimpeded development of the most economic, i.e. the cheapest, forms of transportation to the disadvantage of less efficient means, could lead to even lower costs and an overall increase in the demand for transport above existing levels.

24. Basically, A.Rn.I. considers that the present structure of the transport industry is leading to a misallocation of capital investment and consequently to a misdirection of the country's scarce resources. Unless investment is freely permitted in the most efficient form of transportation available, any attempt to calculate the level of demand for transport must be inhibited to some extent. Demand cannot be considered simply in its relation to supply without, at the same time, taking into account the price factor, i.e. the cost of transport. If the cost of transport available is kept higher than might otherwise be the case, as a result of restrictions on competition from forms of transport which might be more efficient, any attempt to assess total demand for the transport resources of the country must be somewhat arbitrary.

RECOMMENDATIONS FOR A NEW TRANSPORT STRUCTURE AND POLICY:

25. In the light of the comments which have been set out above, A.Rn.I. puts forward the following proposals for consideration, not only in the light of the terms of reference already agreed upon with Associated Industrial Consultants (Pty.) Ltd., but in the light of any new transportation structure and policy which may be formulated as a result of the Consultants' report.
- A. A.Rn.I. considers as a first principle, that the relative roles of the State and private enterprise in the field of transport should generally be complementary, not competitive, to each other. That is, that State intervention should usually be confined to those services which, for various reasons, private enterprise is unable or unwilling to provide. This would not preclude the State competing with private enterprise under certain circumstances, but such competition would need to be justified convincingly as being in the overall national interest. In each case the cost of State intervention should be clearly determined and should be borne by the taxpayer and not just by other transport users.

- B. To give effect to a national transport policy such as this, A.Rn.I. recommends that the Rhodesia Railways Act be re-examined with a view to removing the restriction on the Railways requiring them to operate according to business principles. By definition, A.Rn.I.'s proposed role for the Railways would in general limit their activities to those aspects of transport into which private enterprise was unable or unwilling to enter, i.e. those which were basically unprofitable. Even if the principles embodied in recommendation (A) above are not acceptable, it appears to A.Rn.I. that the requirements in the Rhodesia Railways Act are somewhat inconsistent in this regard in that operating on business principles and providing cheap and efficient transport are not always aims compatible with the needs of the public and the development of agriculture, commerce and industry. Basic policy needs to be clarified.
- C. In any future investment in the country's transport industry, such investment should be made only in those forms of transport which will provide the necessary service with the maximum efficiency. In the Association's view this means, in essence, that investment should in the future be made in those forms of transportation which can provide the necessary service at the lowest cost.
- D. The fact that the guiding principle runs counter to past investment policy in the country's transport industry, is not considered an adequate reason for its rejection. If investment in the country's transport industry has not in the past been in the country's best interests - and A.Rn.I. is of the opinion that this is in fact the case - a change of policy is long overdue.

- E. It is appreciated that any sudden departure from existing policy would require certain transitional arrangements to cushion the effects of such a departure. The Association fully supports the necessity for the introduction of remedial measures during the process of change to cushion its effects, provided only that these do not run counter to the general principles as set out under (A), (B) and (C) above.
- F. In order to ascertain with accuracy the comparative costs of the various forms of transportation available at present, it is considered that the Rhodesia Railways should be required to at least attempt to provide figures showing the actual costs of carrying the various classes of traffic transported by them on a cost per ton mile basis over the various routes. The "General Goods" classification would also need to be further sub-divided to produce any meaningful analysis of movement costs.
- G. All forms of transport (i.e. including air) and all types of traffic (i.e. including passengers) should be included in the survey.
- H. As a first step towards rationalising the country's transport system, the Railways should be required, once the necessary costing referred to under (F) above has been completed, to commence the alignment of their existing rates with the actual cost of carriage as determined by the cost analysis. Such an alignment in rates would not necessarily be made by the Railways, however, where they provided the only means of transport and an alternative service was unlikely to be provided by private enterprise or, where it was considered that the service provided by private enterprise was deficient in one or more respects.

- I. Until such time as the examination of the comparative costs of the various forms of transport has been completed, no further significant investment should be made in the country's transport system. The only exception to this rule being where private enterprise was unlikely to provide a service which it was considered was necessary to meet a specific social need, or where it was felt that the provision of a service was the necessary prerequisite to stimulate economic development, or where the service provided by private enterprise was considered inadequate.
- J. Where it was considered that the national interest required the transport of a certain type of traffic which was not being carried by the existing transport services, or the establishment of a new transport service where none previously existed, State intervention should be financed directly by the taxpayer and not just by other transport users.
- K. Every effort should be made to improve the efficiency of operations of the Railways system provided, however, that any such improvements made are not advanced as justification for further substantial capital expenditure, if the costing referred to under (F) above does not show that such investment would be in the national interest.
- L. It is considered that the Road Motor Services currently operated by the Railways should be withdrawn to allow such services to be operated by private enterprise, unless on the basis of cost analysis, such services can be shown to be more efficient than the services provided by private enterprise. However, where the economics of operations are such that private enterprise is unable or unwilling to provide the necessary service, the RMS would continue to operate on the basis of funds provided directly by the taxpayer along the lines indicated under (J) above.

- M. No unfair restrictions or prohibitions should be placed in the way of "users" providing and operating their own transport.

TEMPORARY MODIFICATIONS TO THE ABOVE RECOMMENDATIONS
CONSIDERED NECESSARY IN THE LIGHT OF RHODESIA'S PRESENT
ECONOMIC POSITION:

26. With regard to the recommendations set out under paragraph 25 above, it is recognised that certain temporary modifications would need to be made to them in the light of Rhodesia's current economic position. A.Rn.I. considers that its recommendations would probably require temporary modification along the following lines:-

- i. With regard to the recommendations under (H) above, the alignment of existing rates with the actual cost of movement as determined by cost analysis should not result either directly or indirectly in an overall reduction in the value of the country's export earnings. It is felt that several factors will need to be taken into account in any evaluation of the effect of increased export costs arising from a revision of Railway rates. For example, increased export costs per se will not necessarily result in a reduction in export earnings, indeed, they could increase them, depending upon the elasticity of demand for the product concerned in the foreign market which, in turn, would depend upon the Rhodesian products' competitiveness in terms of price, quality and delivery dates. In addition, it will be necessary to take the overall adjustment in Railway rates into account before making any hard and fast decision on their effects on an individual export, since the increased cost, for example, of agricultural exports and their anticipated or real reduction as a result, might be more than compensated by increased earnings on industrial exports, where an adjustment of rates had resulted in the latter becoming more competitive.

- ii. With regard to the recommendations under (I) above, further investment in less, rather than more, competitive forms of transport may have to be allowed if such investment is likely to result in a significant saving of foreign currency over and above investment in a more competitive form of transport. For example, if the results of the cost investigation were to demonstrate that the Railways were less efficient than road transport in the carriage of a particular commodity, it might nevertheless be necessary, under present circumstances, to permit further investment in the purchase of new locomotives, where the total import cost was less than that which would be necessary for the purchase of motor vehicles to provide the same movement capacity. In addition, the further demands imposed upon the country's foreign currency resources by fuel and spares would also need to be taken into account.
- iii. Concerning the recommendations set out under (L) above, the abolishment of certain RMS services and their replacement by vehicles operated by private enterprise, could lead to the creation of an import demand for new vehicles with the consequent drain on foreign currency resources. Again, such considerations would need to be taken into account as justifying a possible temporary departure from the overall policy recommended towards the RMS, although a possible solution to the problem might be provided by the sale of RMS vehicles to the private enterprise concerns which would be providing the replacement service.

Association of Rhodesian Industries:

21 July, 1967.

COMMENTS ON THE MEMORANDUM SUBMITTED BY
THE TRANSPORT COMMITTEE OF THE
ASSOCIATION OF RHODESIAN INDUSTRY (A.Rn.1).

In commenting on this memorandum reference will be made to specific paragraphs in the memorandum although the contents of these paragraphs will not be quoted since the memorandum itself appears in full on pages A2 to A16.

Paragraph 3:

The question of passenger transportation was discussed with officials of the Ministry in the initial stages of this study. It was decided that it would be excluded from the study as the question of passenger transportation ties in very closely with suburban development programmes being considered at the moment by the Government. Although it was agreed that a passenger transportation study should be conducted it was felt that one could safely proceed with a transportation policy directive as was done in this survey.

As regards the air transportation of goods it can be safely assumed that at present this medium is responsible for only a very small portion of the total goods transportation.

The time factor involved in studying these other transportation mediums would have caused a basic delay in the formulation of a directive for the transportation policy of Rhodesia. For this reason they were omitted from this survey.

Paragraph 10:

The A.Rn.I's comment on the development of a transportation service at the lowest possible cost could be described as the most important basic principle which was adopted in this study. The whole approach of the study was directed at diverting traffic from the less economic mediums of transportation to mediums which would be more economical. The Railways, for example, can operate more economically than road transport on long distance haulage, whereas road transport operates more economically over short distances than transport by rail. The principal recommendations made in this survey are, therefore, in accordance with A.Rn.I's views. The outcome of the study may, however, come as a complete surprise to them.

Paragraphs 16 and 17:

The basic problem as regards competition between rail and road is in fact the lack of information on the cost of transporting particular goods by both rail and road and the fact that railway and road tariffs do not reflect their costs. One of the principal recommendations made in this study is that tariffs based on costs be enforced for both rail and road transportation.

With regards to the statement that Public Service Hauliers provide a better service than the service by rail on high tariff goods, it could theoretically be assumed that these high tariffs reflect the railway costs although they do not reflect the higher road haulage costs. The question arises whether industry would still prefer long distance road haulage if a higher road tariff were involved. In fact by supporting road haulage over long distances (and commerce have no alternative since their total user costs must be lower for specific goods),

Railways are losing revenue which could have been used in cross subsidising low tariff goods which are transported on behalf of commerce, industry, mining and agriculture.

ANNEXURE 2

Selected comments received from unidentified
Public Service Hauliers in response to
a questionnaire forwarded to them by the
Central Statistical Office.

SELECTED COMMENTS RECEIVED FROM UNIDENTIFIED
PUBLIC SERVICE HAULIERS IN RESPONSE TO A
QUESTIONNAIRE FORWARDED TO THEM BY THE
CENTRAL STATISTICAL OFFICE

QUESTION 9:

Do you consider the present system of "Public Service Haulage" regulations and controls as adequate? What improvements would you suggest?

Comment 1. "The present regulations are considered to be cumbersome and a tendency has arisen for the operation of the Road Service Board to become too much identified with the proceedings of a court of law. It is considered that the Road Service Board should be replaced by a full-time Road Traffic Commissioner assisted by a permanent Secretariat. Furthermore, the respective functions of the Ministries of Transport and of Roads and Road Traffic should be rationalised so as to ensure that all Transport policy matters are the responsibility of a single Ministry".

Comment 2. "As in most legislation and regulations, we are copying the older countries wholly. This is wrong because we are a new developing country and only the bare essentials of the older countries' laws should be imposed. It is the same as demanding that a 16 year old should behave in every way like a 60 year old. Nothing on the safety side should be reduced, but there are a lot of other regulations that can be insisted on and the Inspectors have a difficult enough

job as it is, as well as forms to be filled in. The system of licensing is the most unfair ever devised. To impose the same tax on a heavy 2 tonner as the largest vehicle PSV is really unfair and the Government is losing money. The one earns from 4 to 6 times as much as the other. If the one can afford to pay £144 per annum the other can pay £600, or reduce the tax on the lighter vehicles."

Comment 3.

"We feel that some investigation should be made into the Constitution of the Road Service Board with a view to implementing a policy of continuity of employment within the Department. It would appear to us that on the present structure, whereby the majority of the members are employed on a part-time basis it could well be stated that there is no continuity of experience and knowledge of overall transport problems, to enable the Board to reach immediate and rational decisions. Moreover, the Public Servants, particularly in the higher grades will give advice and information to the Board to reach these decisions are not assured of promotion in this Department and may be moved to some other area of Government Employment - the experience thus being lost to the Transport Industry. We feel that it would be useful to the Industry

if senior members of the Board were drawn from the various sections of the Transport and Allied Industries, i.e. Agriculture, Railways etc., and that if promotion is given to the Secretary to the Board he should, in view of his past experience, become a Permanent Member of the Board in order that this experience may not be lost."

- Comment 4. "Rigid time limits on Road Service Board hearings - cutting out of lengthy diatribes by countless "Witnesses". More emphasis on transport requirements and common sense and less on legal "gimmicks", as in the case of
..... endeavouring to use Road Service Permits to sell
..... activities. Road Service Permits should be restricted to those who operate Transport Businesses." (...=censored)
- Comment 5. "A road transport authority would be preferable to ascertain the needs of the industry, and it would not be necessary for applicants to employ legal personnel to argue cases, which are often argued on legal grounds only and the facts are obscured."
- Comment 6. "We are of the opinion that all vehicles and trailers with a carrying capacity of over three tons must have a yearly Certificate of Fitness. We would also like to suggest that the Road Service Board becomes a full-time occupation for all members concerned, or that a traffic commissioner be appointed with assistants and that no less than three members sitting at hearings."

QUESTION 10:

Should stricter controls be instituted on "private hauliers" and why?

Comment 1. "While accepting the basic right of anybody to carry his own goods in his own vehicle there is at present no effective control of the activities of private hauliers some of whom indulge in 'pirating' operations. As a first step it is considered that all goods vehicles of over, say, 1 ton carrying capacity should require a licence or permit limiting their use not only to the carriage of goods which are the property of the operator of the vehicle but also as to the scope of operations of the vehicle. The law in regard to the operation of transport by so-called 'co-operatives' as well as by any form of partnership and associated companies should also be clarified."

Comment 2. "Private Hauliers should operate under a "C" Licence and should be subject to the same legislation and regulations regarding Certificates of Fitness and Permits as Commercial Transport Operators, and the same regulations as regards employment of Drivers and allied employees."

- Comment 3. "Yes. Because in most instances these people are merely subsidizing their products by sub-economic transport, but are not called upon to pay the overheads of the legitimate transport operator."
- Comment 4. "Our answer to this Section is 'Yes'. Stricter control should be kept on private hauliers. We say that any private vehicle over seven tons carrying capacity which intends to operate outside a 50 mile radius of base, must have the authority of the Road Service Board. The Government is losing a considerable amount of revenue due to the fact that private hauliers are paying considerably less road tax for the use of roads as against the same vehicles operating under P.E.V. permits. We therefore, suggest licence fees for all commercial vehicles should be the same.

In many cases the buying of dead permits has taken place and we consider this practice to be wrong. In our opinion if a permit has not got a Certificate of Fitness relating to a specific vehicle yearly, then that permit must be surrendered to the authority concerned.

All vehicles of over three tons carrying capacity shall display the owner's name, address and base of operation. The base shall be the place of production or business and not a nominated office."

Comment 5. "Not, as yet, in the case of the vehicles just used for local deliveries, but permits should be obtained from the Road Service Board for the larger vehicles which are at present allowed to and do travel all over Rhodesia, to the detriment of P.S.V. operators and the Railways. Because P.S.V. operators have to abide by Transport Operating Regulations, governing conditions of employment etc., have to pay higher licences, have to have a Certificate of Fitness for each vehicle etc., they cannot hope to compete in their own field - especially with their restricted permits. It is particularly difficult to understand why vehicles without P.S.V. Licences do not require a C.O.F."

QUESTION 11:

Any other remarks on competition in transportation?

Comment 1. a. "Railways: It should be accepted that the proper functions of the Railways should be to provide for:-

- i. Bulk loads, especially minerals, timber, fuels, agricultural produce, cattle, machinery and building and constructional equipment.
- ii. Bulk Imports and Exports.
- iii. Limited International Express Passenger Services and that the internal movement of passengers and distribution of goods is most efficiently and economically the province of road transport.

This policy would ensure the provision of a network of first class roads which is of the greatest importance for the development of the country as a whole.

Private capital would be encouraged to provide adequate road transport services thus on the one hand conserving public funds and on the other producing increased public revenue from licences, permits, fuel tax and income tax.

- b. Railway Road Motor Services - should be treated in exactly the same manner as private road transport operators and receive no special privileges whatever.
 - c. Commercial Vehicles (own account)) should in general be
 - d. Farm Vehicles (own account if) subject to
used on public roads)) licence & permit
 - e. Farm Vehicles (syndicates)) control as indicated
 - f. Other Public Service Hauliers.) in Section 10 above.
- Attention should be drawn to the

Attention should be drawn to the)10 above. indisputable fact that the world wide trend is from Rail to Road except for the traffic mentioned above. The Government should in practice, as well as in theory, regard the Railways as an industrial entity which must be viable without subsidy. Any subsidies should be to the goods carried and not to Rail, and certainly not hidden behind advantages peculiar to the Railways. The basic policy for the Railways should be reviewed in this light."

Comment 2. "Although we are in competition with "A, B & F" and fight them all along the road for work, we have had co-operation from them when necessary, although a few in the last category will not under any circumstances. There is a practise growing where when one company owns trucks on black number plates for their own work now work for other companies which they say are subsidiaries or in which they have an interest, if this practise is allowed to grow then you can write off the P.S.V.'s as one could buy a share in and then perform all their transport on black number plates, where ever they are in Rhodesia."

Comment 3. "(b) Road Motor Services are usually wasting a lot of salaries, fuel, tyres etc., because they only use very big vehicles for many times very small loads. Other Public Service Hauliers can use the right vehicle for the right loads."

Comment 4. "a. Railways:
Competition by the Railways, as experienced by this Company, is limited in extent and consists mainly of their steadfast objection to additional permits to operate services in competition with those operated by the Railways. In particular, this Company's application to offer a daily service from Salisbury to Sinoia where no such service apart from the Railways,

exists was refused on the grounds that there was a Railway service. Very little notice was taken of the fact that persons trading in Sinoia and suppliers in Salisbury felt there was need for a Road Transport Service, and competition with that service was not allowed to materialise. Surely the general public should have the right to choose how they wish their goods to be transported especially in a case where only a Railway service is provided.

b. Road Motor Services:

Competition of a different nature has been experienced from this branch of the Railways. The Road Motor Services take considerable time and trouble producing a tariff book. This comprehensive document covers the movement of all goods & the rating structure which, if followed, can provide a reasonable livelihood for any haulier. However, it has been our experience that the Road Motor Services do, on several occasions when faced with competition from private hauliers such as this Company, disregard this tariff book, in some cases it would appear with little or no knowledge of transport costing.

c. Commercial Vehicles (own account)

No comment.

d. Farm Vehicles (own account)

The remarks in answer to Question 10 appear to cover this.

e. Farm Vehicles (Syndicates)

The competition from this form of pirating has been experienced by this Company for a period of seven years and appears to be unfair in that such Syndicates are not faced with the additional expenses of the Public Service Vehicle Haulier in that they do not appear to require:

- i. A Road Service Permit;
- ii. The annual Certificate of Fitness;
- iii. Payment of N.I.C. labour rates;
- iv. Public Service Vehicle rate of vehicle taxation;

They are, therefore, able to operate, if they do not wish to show a profit, at a rate lower than that of the licenced haulier.

However, they are not in a position to cope with seasonal demands for the movement of agricultural produce and members of these Syndicates call on public hauliers to cope with these demands.

f. Other Public Service Hauliers:

Competition from this source is usual on a price basis. It appears to this Company to be completely unnecessary. If all permits were endorsed "No rate to be charged less than the Road Motor Services tariff" competition would exist on the basis of service only. This Company feels that the service afforded to members of the Public is not what it could be with rates being kept at a low level but there is little or no room for good public relations to be maintained. Many verbal contracts are entered into and are subsequently revoked as hauliers find more lucrative traffic on offer and generally the industry is regarded as being composed of "highwaymen" and "footpads". Owing to the existing system of permits, authorised hauliers have built up areas which they consider to be their own areas of operation. They afford services in these areas, because of the demands made upon them, which are extremely adequate. However, other hauliers with similar permits each in such territories on a price basis only during seasonal rushes with little or no regard to the haulier who is prepared to give an out of season service.

- A31 -

This Company feels this unnecessary form of competition could be controlled by adequate price structures which would again in the long term be in the National and the haulier's interest."

- A32 -

ANNEXURE 3

Memorandum submitted by the Associated
Chambers of Commerce of Rhodesia.

ASSOCIATED CHAMBERS OF COMMERCE OF RHODESIA:

A COMMERCIAL VIEW OF TRANSPORT:

INTRODUCTION:

- 1.1. An examination of the existing transportation structure in Rhodesia was conducted at the request of a firm of industrial consultants which had been commissioned by Government. The basic terms of reference were "directed to the purpose of 'optimising' capital investments by planning and controlling transport capacity, availability and utilisation (including railways) in relation to the transport requirements, as dictated by the present and expected economic activities of the country". ACCOR acknowledges that it is essential at all times, and particularly in times of economic difficulties, to use all resources as economically and efficiently as possible.
- 1.2. This memorandum records the opinions of the study group formed by ACCOR to examine the transport system. A certain amount of evidence has been taken from representatives of various commercial interests, but it has not been possible, in the time available, to investigate the problem in depth and to take the wider range of views which a matter of this complexity requires. For this reason ACCOR wishes to reserve the right to study and comment on any new proposals which may be formulated as a result of the overall investigation.

- 1.3. It has always been ACCOR's firm conviction that the principles of private enterprise must be upheld and the rights of the individual preserved. It must be acknowledged, however, that some measure of state supervision and guidance is necessary to protect national interests, and the transport system is no exception. Nevertheless, it must always be borne in mind that Rhodesia is at a relatively early stage of development and the sophisticated transport systems operating in some other countries would be inappropriate here. Regular hauliers must be given every encouragement and opportunity to conduct a viable enterprise, but at the same time, a great deal of tolerance is required in the transport system, and for this reason control should not be completely restrictive.
- 1.4. ACCOR's aim in examining the problems surrounding this question has been that a balance should be struck whereby private enterprise has the freedom to operate so long as it is efficient in terms of its utilisation of its transport investment, but that a degree of state guidance is necessary to achieve this. It is considered most undesirable that state interference should be any greater than is necessary to achieve these objectives. ACCOR strongly upholds the principles that an individual must at all times have the right to transport his personal property anywhere and that he must have the freedom to choose the mode of transport he wishes to use to meet his requirements.

- 1.5. The present situation in Rhodesia is that goods tend to be carried by whoever is prepared to carry them, whether that might be the merchant who sells the goods, the regular road transport operator or the railways. Each of these has advantages and disadvantages peculiar to the type of operations normally carried out, and it is considered that it will be most profitable to attempt to exploit the preferential circumstances enjoyed by each type of transporter. ACCOR believes that any moves aimed at rationalizing transport activities should be towards reducing the areas of overlap, and guiding operations in the various spheres of transport towards those organisations most capable of fulfilling the requirements. It is necessary therefore, to consider the operations of each of the main spheres of transport activity.

PRIVATE ROAD TRANSPORTATION:

- 2.1. It is a common and established facet of business activity that the merchant is frequently requested to deliver goods to a purchaser, and in the interests of good business relations, he will avoid refusing if possible. Most of this type of activity takes place within the urban areas, where the size of the demand usually makes such operations economic. The profitability of making regular deliveries is directly linked to the population density of the area concerned.

In some circumstances and under competitive pressures, merchants undertake deliveries further afield. However, the demand and the number of deliveries which can be combined diminishes sharply as the urban boundary is passed.

PUBLIC VEHICLE OPERATORS:

3.1. The regular public service vehicle transport operator carries other people's goods for profit and therefore has no margin from the sale of goods to absorb his costs. For this reason, the economies of operation occur at a different level from that applicable to "merchant operators". The main factors affecting the profitability of operations are:

- a. the proportion which waiting and handling time bears to running time;
- b. the distance travelled;
- c. the size of the load; and
- d. whether a return load is carried;

With regard to (a), handling time is almost akin to wasted time to a transport operator, for during this period the chief investment item, the vehicle, is lying idle, with its operatives engaged on less productive tasks; (b) is probably self explanatory; the greater the distance run, with reservations, the greater the economy; (c) is also important since profitability varies with the size of the load; (d) is a factor particularly relevant to long distances and operators are able to offer substantial reductions in tariffs where return loads are guaranteed.

It is generally uneconomic for a regular haulier to operate within an urban area at a tariff acceptable to the consumer. The ideal operation for a haulier would consist of a long trip, say 200 - 300 miles, with a load in each direction with no intermediate stops. The regular haulier is an expert in the transport field and it is, therefore, logical that he should perform those operations in which he excels.

RAILWAYS:

- 4.1. The factors affecting the profitability of a road haulier's operations similarly affect the operations of a railway, but on a higher plane. Distances required to make hauls economic are greater than those applicable to road transport and because of the far greater investment of capital involved, the effect on profitability of time spent on handling or waiting is more severe. Railways do not regard hauls of under 250 miles as being profitable. Nevertheless, the type of article carried frequently dictates against economic ideals.

Loads having high bulk and weight factors are almost the exclusive domain of railways, since in many instances no other means of transport would meet the requirements. However, the factors of weight and bulk frequently represent unprofitability, since the principle of charging "what the traffic will bear" must be applied. Unfortunately, this is a facet which cannot be avoided, but must be regarded as a service performed by the railways for the benefit of both the producer and consumer, and therefore of national interest.

PROBLEMS OF THE EXCEPTIONS:

- 5.1. There are certain circumstances and types of merchandise which do not readily fall into the category of transportation to which they should logically belong, and must therefore be the subject of some consideration.
- 5.2. In some sectors of commerce it is necessary for a service to be performed at the time of delivering goods sold. This applies particularly to the installation and

demonstration of electrical or mechanical equipment. It would be ludicrous to suggest that the goods should be transported by a regular operator, to be followed in a separate vehicle by a technical expert. For this reason, ACCOR believes that there should be no governmental control of the delivery of goods where an additional service is an essential part of the contract.

- 5.3. There are certain types of merchandise which require specialist transportation; such items include glass, liquids in bulk, such as fuel, African beer, milk etc., furniture, fragile goods, perishables and goods requiring refrigeration. It is considered that unless regular transport operators can offer a competitive service, such transportation should be left to the supplier. However, it is felt that in the interests of the most efficient use of capital assets, transport operators should be encouraged to provide such services.
- 5.4. There are also occasions when a merchant may be called upon to supply an item at short notice, to meet a particular emergency which has arisen. This applies frequently in the case of dairy feed where a failure in the continuity of supply may have drastic effects on yields. Similar situations occur through mechanical breakdowns. It is considered that in these circumstances, the overall system must be sufficiently flexible to permit merchants to meet emergencies.

- 5.5. A minor problem also arises from the districts which immediately surround the urban areas. These districts, by virtue of their proximity to the towns, have been accustomed to fairly good delivery services. Nevertheless, since the boundaries of the urban areas tend to demarcate the end of the high demand areas, it is felt that these areas might best be served by a special licence. It is not intended to encourage deliveries beyond the urban areas since at this point the economics of such transportation fall rapidly. However, where a merchant conducts a large amount of business within this bracket, the choice of whether or not to obtain the necessary licence would probably be dictated to him by circumstances, and he would be able to determine whether this extension of delivery services was economic.
- 5.6. A problem arises for the merchant determining the method by which he will have his goods transported, from the question of the amount of packing required to meet the demands of the transporter, and in some instances, it is this factor which prompts the merchant to use his own transport. However, if transporters can be encouraged to make greater use of container services, this problem may be greatly alleviated. Such services are widely used in some advanced countries and Rhodesia might well benefit from a close look at the advantages flowing from such systems. In the short term, this question must be left to be resolved by the competitive influences on the parties involved.

AIM OF THE SURVEY:

- 6.1. Having examined the types of transport available, together with the types of merchandise to be carried and the problems arising therefrom, it will be useful to outline the aim, as seen by ACCOR, of any future policies directed at guiding transportation. Since regular transport operators, both rail and road, are experts in these fields and have all the specialised knowledge available to effect the greatest economies, it is logical that the bulk of the country's transport requirements should be guided into their hands. Nevertheless, there must, at the same time, be sufficient freedom to allow merchants to operate in those areas where most of their business is conducted and where it is economically justified, subject to sufficient latitude to meet specific circumstances. The system must be sufficiently flexible to allow merchants to provide those services which regular hauliers are unable to provide for one reason or another. It is hoped that the proposals which follow will have the effect of encouraging efficient use of transport investment rather than imposing choking controls.

SUGGESTED SOLUTIONS:

- 7.1. In broad principle ACCOR believes that all vehicles carrying goods, other than bona fide personal effects for private use, or goods not intended for re-sale, should be the subject of a licence. Public Service Vehicles are already subject to a special licence and it is felt that this principle should be extended, subject to qualification.

7.2. It is proposed that a special licence be created and it is envisaged that the following conditions would apply to the licences, which, for the sake of simplicity, will be referred to as 'S' licences -

1. They would only apply to vehicles of over 5,000 lbs weight; vehicles below this figure would be exempt.
2. The licence would not be required for operations within a 15 mile radius of towns.
3. The fee for the 'S' licence would be in the region of £120. p.a.
4. Holders of the 'S' licence would only be permitted to deliver or collect goods sold or to be sold through their own businesses.
5. No restriction would be imposed on the field of operations of an 'S' licence holder.

7.3. It would be necessary to permit a number of exemptions, both general and specific, relating to particular commodities carried, or to the areas of operation, or to a combination of both. These exemptions would be determined on the basis of whether or not a regular haulier could provide the service. Where an exemption had been granted and a haulier was subsequently able to demonstrate that he was capable of providing the service, then the exemption would be subject to review. It appears essential that machinery should be provided to enable parties to make representations on the exemptions allowed or not allowed. It is envisaged that the exemptions would be published as a Government notice permitting persons operating in the specified field to be exempt from the requirement to apply for the 'S' licence.

- 7.4. It is anticipated that exempt commodities would include, glass, bulk liquids, building materials, mechanical equipment, etc., and that the exempt areas would, in the main, consist of the remote rural areas not served by regular hauliers. It would also be necessary to provide exemptions for situations such as the following, which could not be met by the regular hauliers:-
1. Deliveries requiring a service as an essential part of the contract; and
 2. Vehicles carrying goods to "exempt" areas from "non-exempt" areas.
- 7.5. It is considered that any member of commerce carrying goods in the course of his business should be permitted to make a delivery charge. This would eliminate the present anomaly whereby, if a merchant who does not hold a P.S.V. licence, reflects a delivery charge on an invoice, he contravenes the Roads and Road Traffic Act, whereas if he adjusts the selling price of his goods to meet this overhead, he commits no offence.
- 7.6. ACCOR considers that the professional road hauliers and the railways should be permitted and encouraged to compete without artificial advantages being given to one or the other, except where measures are necessary to subsidise an activity of national benefit which could not be performed on a profitable basis. Subsidies, however, should only be provided after very careful consideration since they may have the effect of destroying the balance of the system.

- 7.7. All these proposals have aimed at a better use of the available investments in the present circumstances. However, in our stage of development, we must not restrict ourselves to examining the existing facilities and methods of transportation, but must be alive to the modern developments in this field. Consideration might profitably be given to the developments in the use of pipelines established in America and Canada, where a variety of products other than fuel oils are now being transmitted by this method with startling economies. It is appreciated that such a method involves vast capital investment which might well be unwarranted at this particular stage of national development. Nevertheless, progress is inextricably linked with a progressive outlook and such developments must not be discounted without serious consideration.

CONCLUSION:

- 8.1. ACCOR believes that all responsible authorities in Rhodesia must be alive to the problems involved in the field of transportation and should keep abreast of new developments aimed at better use of the vast investment involved in transport organisations. There is already an extensive rail system in Rhodesia, and a large section of Rhodesia is served by first class roads; developments in this direction can be viewed with pride. Nevertheless, it is essential for the continued expansion of Rhodesia that these services be progressively extended, until all areas of Rhodesia enjoy the benefits flowing from a comprehensive transportation network in which the total capital investment is utilised to the greatest national benefit.

ANNEXURE 4

- i. Evidence submitted by the Rhodesia National Farmers' Union (page A45).
- ii. Comments (page A50).

RHODESIA NATIONAL FARMERS' UNION

R.N.F.U. EVIDENCE TO THE CONSULTANTS APPOINTED
BY THE MINISTRY OF ROADS AND ROAD TRAFFIC:

RECOMMENDATION:

The R.N.F.U. recommends that the Roads and Road Traffic Act be amended to permit farmers, licensed under the Farmers' Licensing Act, (Chapter 210), to carry farm requisites and produce, for hire or reward.

BACKGROUND TO THE RECOMMENDATION:

European farm income has been declining since 1961 and for this reason the farmer has become very cost conscious. The farmer has not overlooked transport in his efforts to reduce costs and the R.N.F.U. has been under considerable pressure from its members to discover a means of reducing transport costs.

ROAD SYNDICATES:

In the last two years a number of so-called road syndicates have come into existence. The first syndicate, called the Charter Road Syndicate, was established in about April, 1965 between four farmers in the Beatrice area. It operated on the principle that the farmers clubbed together to buy a truck which was jointly owned by them for the purpose of transporting their own milk into the Salisbury Dairy Marketing Board depot. Expenses were shared.

Transport charges by the transport operators in the area were too high and all but swallowed their profit margin. Each individual farmer could not afford to run his own truck and the idea of clubbing together to buy a truck jointly was born to overcome the insecurity and high cost of public transport in the area.

The costs of operating the truck were shared proportionately to the use made of it, e.g. one sending in 100 gallons daily would contribute twice as much to running expenses as one sending 50 gallons per day. In this way the actual transport cost was reduced from about 4½d per gallon to approximately 3d per gallon.

A complaint was lodged in November, 1965, by a public operator, alleging a contravention by the Syndicate of Section 124 of the Roads and Road Traffic Act. The Syndicate's lawyer maintained that a Public Service Vehicle is described in the Act as "a motor vehicle ... used for the carriage or haulage of passengers or goods or both for hire or reward on one or more occasions". Their case rested on the fact that under this joint ownership scheme there was no reward.

On the 5th September, 1966, the Charter Road Syndicate was taken to the Magistrate's Court in a test case. When the judgement was given on the 30th September, 1966, the Charter Road Syndicate was acquitted. On the 16th November, 1966, the Charter Road Syndicate was informed by the Attorney General that he was going to take the case on review to the Appeal Court.

The Judges, on review, found that the Salisbury Magistrate was wrong in acquitting the farm Syndicate, ruling that the truck was used for the carriage of goods for reward and that, in law, these four men should not have been acquitted.

There are now in existence at least four other syndicates and the R.N.F.U. has been under considerable pressure to get the law amended to permit farmers to use transport in this way.

Before making its recommendations, the R.N.F.U. closely examined transport policies in other countries, with particular emphasis on their policies in relation to agricultural produce. In this connection, extensive use was made of the findings of the United Kingdom Ministry of Transport's Report of the Committee on Carriers' Licensing, popularly termed the Geddes Report. The Committee's terms of reference were:

"In the light of present day conditions, to examine the operation and effects of the system of carriers' licences first introduced by the Road and Rail Traffic Act 1933, and as subsequently modified by statute; and to make recommendations".

Their conclusion as to the present system of licensing was:

"Neither the present system of licensing nor any variant of it based on control of the number of lorries and restriction of what lorries may carry offers a useful way to achieve what we think might be the main aims of government policy in regulating carriage of goods by road.

In three respects such licensing acts adversely.

It reduces efficiency. It tends to confer positions of privilege. And it tends to add to congestion on the roads."

Broadly, the Committee recommended the abolition of all restrictions on a capacity of the road haulage industry and on the work for which a lorry may be used. In examining the likely consequences this would have on the road haulage industry, the Committee investigated road policy in different countries and found that in the few cases where there was little restriction on road transport, this seemed to have brought benefits without any dire consequences.

UNITED KINGDOM:

In the United Kingdom the law provides that if a farmer takes out a "C" licence for his vehicle, he may use it, not only to carry his own goods, but he may also carry, for hire or reward, the goods of other farmers in the same locality. The National Farmers' Union in the U.K. strongly supports the continuation of this practice because of its great value to farmers in remote areas.

UNITED STATES OF AMERICA:

Certain classes of agricultural goods are exempt from control in the U.S.A. Any carrier, whether licensed or unlicensed, is entitled to carry these goods and may charge whatever rate he pleases. In effect this means that the road transport operations in the agricultural sector are completely free of any Government regulation beyond safety requirements. This concession is highly prized by farmers in the U.S.A. because they believe that the concession allows them to obtain a better transport service at lower cost.

The Farm Management Department of the R.N.F.U. has estimated that farmers could transport their goods at about a third in reduction on R.M.S. rates. While this might not be significant in the case of farmers close to line of rail, it can make as much as 1/6d per bag difference to a farmer's costs of producing maize in some of the outlying areas.

The R.N.F.U. believes that all the evidence it can produce supports the fact that certain farmers could materially reduce their costs if they were permitted to form groups and pool transport. The evidence in other countries does not support the fact that hauliers will be adversely affected to any large extent and the resulting savings by the farmer will increase his profit and thereby encourage larger production for export, to the benefit of the country as a whole.

In examining the problem, it has become apparent to the R.N.F.U. that there are a number of ways in which the recommendation could be put into practice. The R.N.F.U. does not wish to submit detailed evidence on this aspect, but wishes to draw the Consultants' attention to two suggestions which have been put to us.

The first is that farmers licensed under the Farmers' Licensing Act (Chapter 210), be permitted to purchase a special licence which would allow them to carry farm goods and produce for hire or reward.

The second suggestion is that Transport Co-operative Societies, registered under the Co-operative Societies Act (Chapter 225), be permitted to purchase a special licence which would allow them to transport the goods of their members.

AAR/SS
26th July, 1967.

No. 4737.

COMMENTS ON THE TRANSPORTATION MEMORANDUM
SUBMITTED BY THE RHODESIA NATIONAL
FARMER'S UNION

In principle the Rhodesia National Farmer's Union (R.N.F.U.) requires the following transportation opportunities for its members:-

..... "that farmers licensed under the Farmer's Licensing Act (Chapter 210), be permitted to purchase a special licence which would allow them to carry farm goods for hire or reward" and,

..... "that Transport Co-operative Societies, registered under the Co-operative Societies Act (Chapter 225) be permitted to purchase a special licence which would allow them to transport the goods of their members."

The above requirements can be motivated on economic grounds. The farmers' vehicles are required for the transportation of bulk goods on farms and as such are subjected to seasonal fluctuations in the use of loading capacities. What the farmers require is the opportunity to utilize their vehicles more economically. Pooling of interests would promote lower costs of transport, less investment in transport capacities and a more economical use of these capacities.

Certain other factors should, however, be considered in relation to the above R.N.F.U. requirements.

A. Farmer syndicates:

1. In principle farmers should only be allowed to carry agricultural products and requirements.
2. Restrictions should be introduced similar to those recommended for Public Service Hauliers as regards farmers who can make use of the Railways up to rail distances not exceeding 80 miles from the nearest railhead.
3. No restrictions should be placed on the delivery to markets of listed agricultural products which are subjected to deterioration in quality, such as vegetables, fruits and dairy products.
4. Where fresh farm products are transported to centres outside the imposed limits these vehicles should be permitted to transport other agricultural requirements. This would promote a more economical utilization of these vehicles. The running of empty vehicles to centres outside the imposed limits with the purpose of bringing back full loads, should be severely punished. Exceptions should be made for small trucks, of say $1\frac{1}{2}$ ton capacity, which could be used for personal transport.

5. The regulations imposed on Public Service Hauliers regarding vehicle inspections, etc., should also apply to farmers.
6. Syndicates should be allowed to apply for special permits. These permits, however, should not allow the syndicates to transport goods for farmers who are not members of the syndicate. Transport on behalf of syndicate members should be considered as on own account transport.

B. Farmers' co-operative societies:

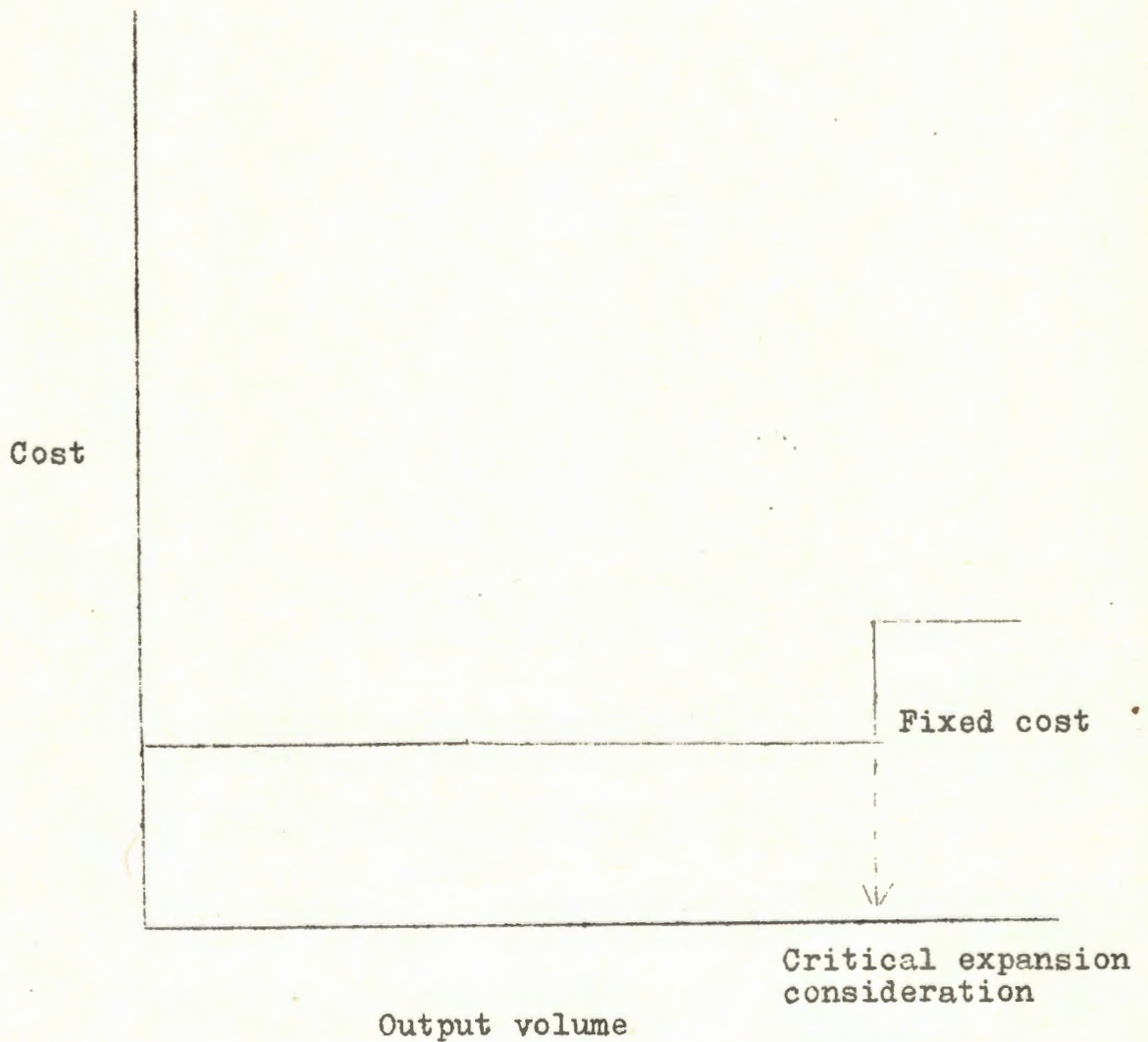
These societies should be granted permits to carry agricultural products and requirements on behalf of their members. The conditions, restrictions and application procedures imposed on Public Service Hauliers should also be imposed on these societies.

ANNEXURE 5

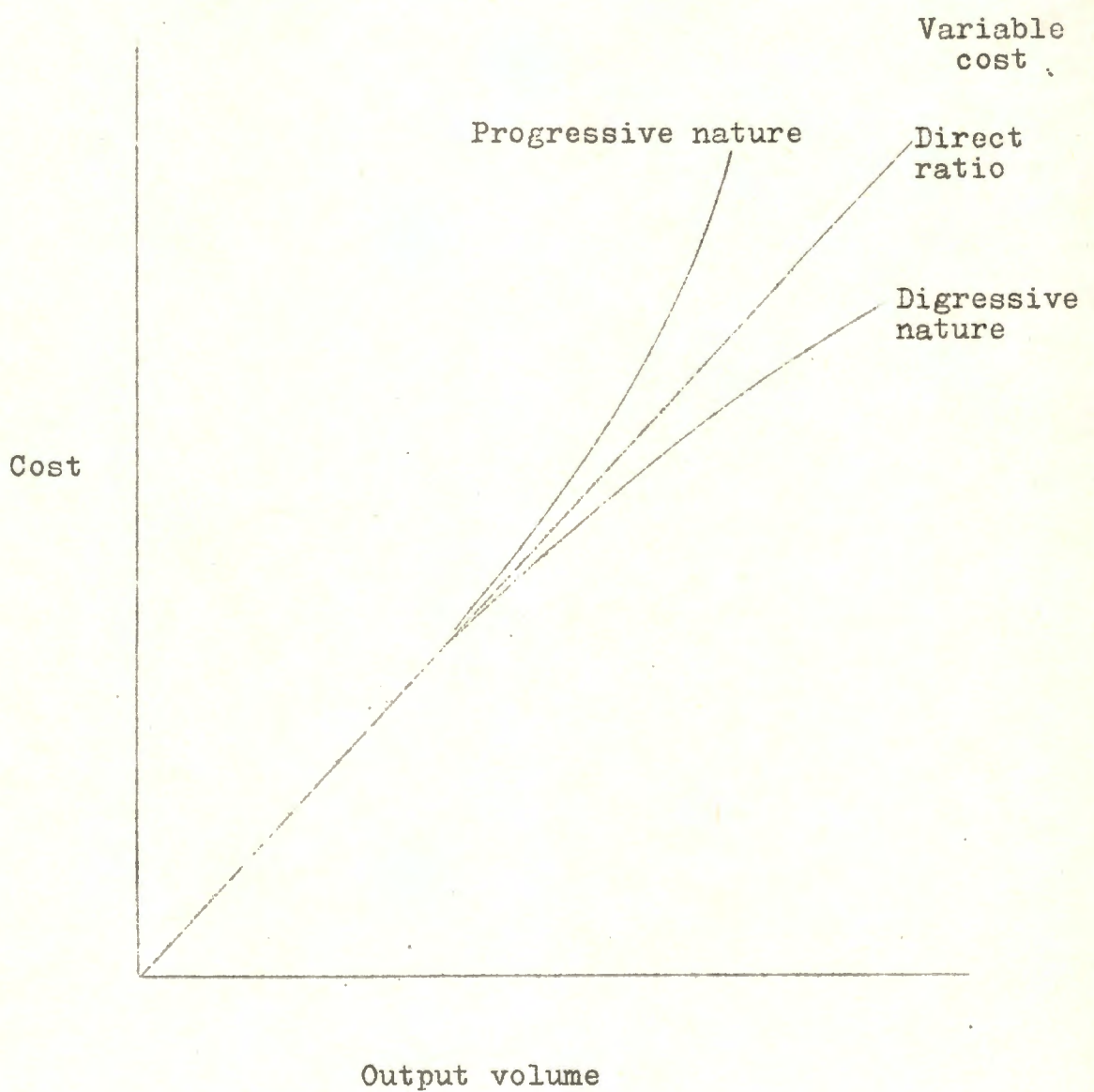
GRAPHS

- i. Behaviour of fixed cost with increases in output volume (page A54).
- ii. Behaviour of variable cost with increases in output volume (page A55).
- iii. Behaviour of semi-variable cost with increases in output volume (page A56).
- iv. Influence of density of goods on the cost of transportation (page A57).
- v. Equal-sized cost/density index groups resulting in unequal-sized weight utilization factor ranges (page A58).
- vi. Various levels of fixed terminal costs per ton for different goods (page A59).
- vii. Variable cost of moving one ton of different categories of goods (page A59).

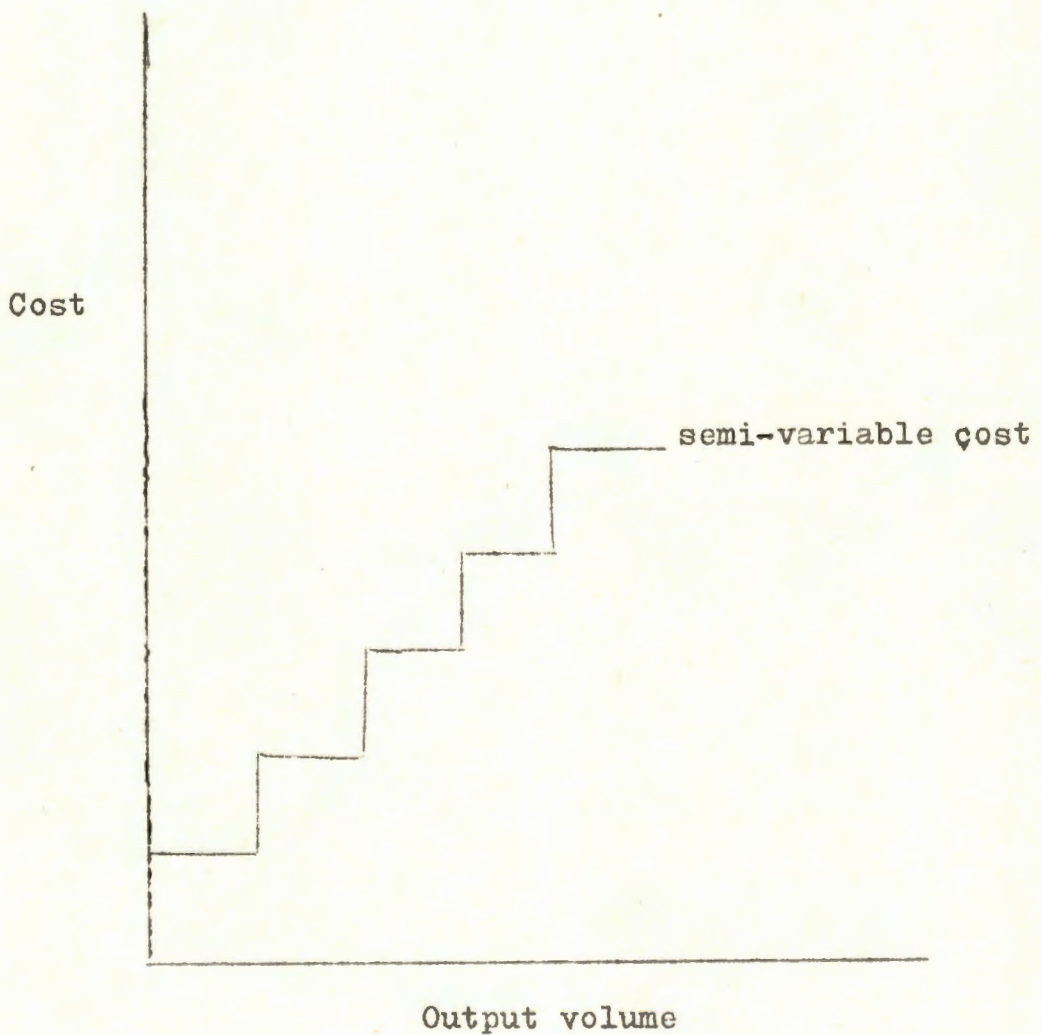
Graphic illustration of the behaviour of fixed
cost with increases in output volumes



Graphic illustration of the behaviour of
variable cost with increases in output volume:

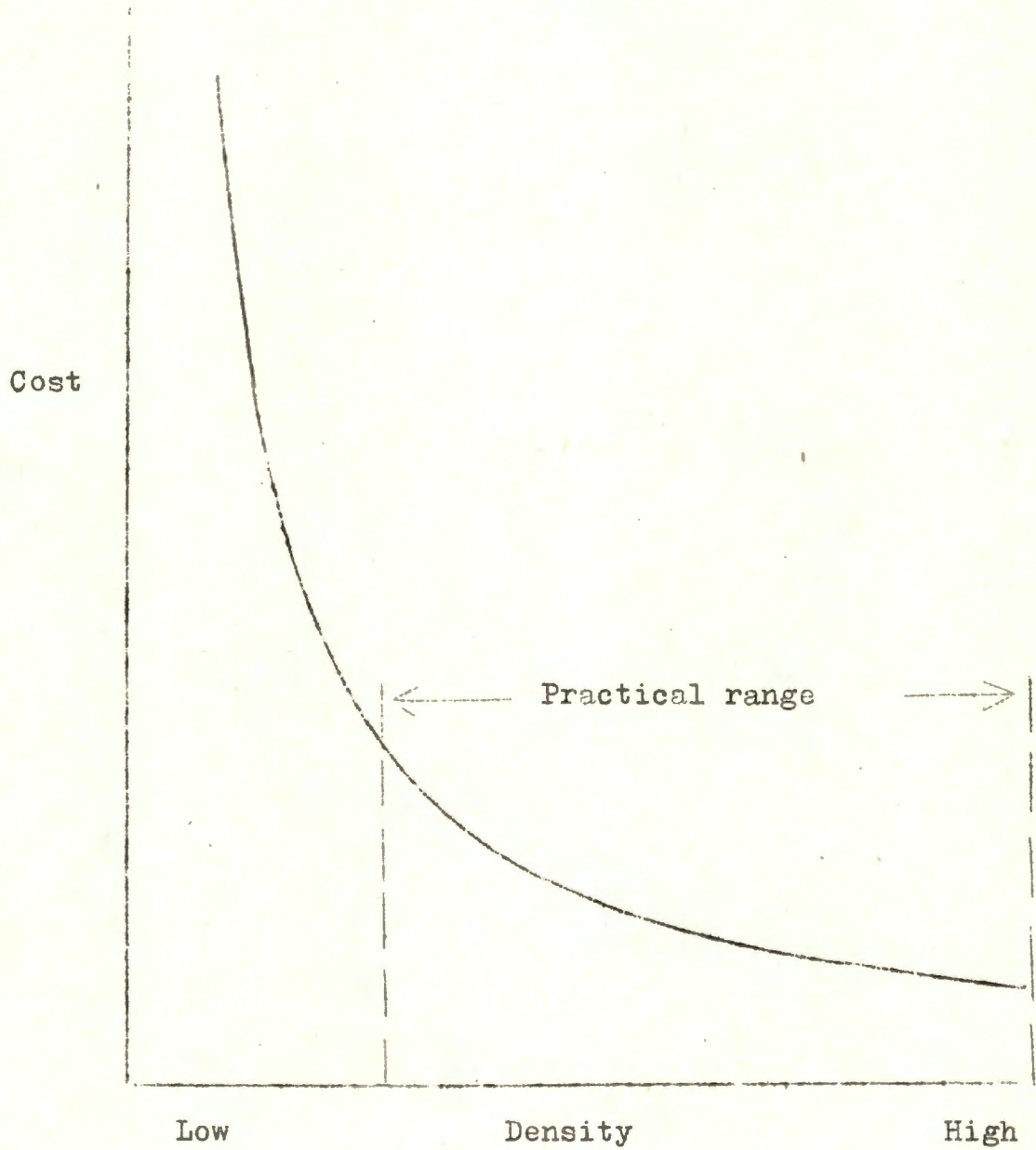


Graphic illustration of the behaviour of semi-
variable costs with increases in output volume:

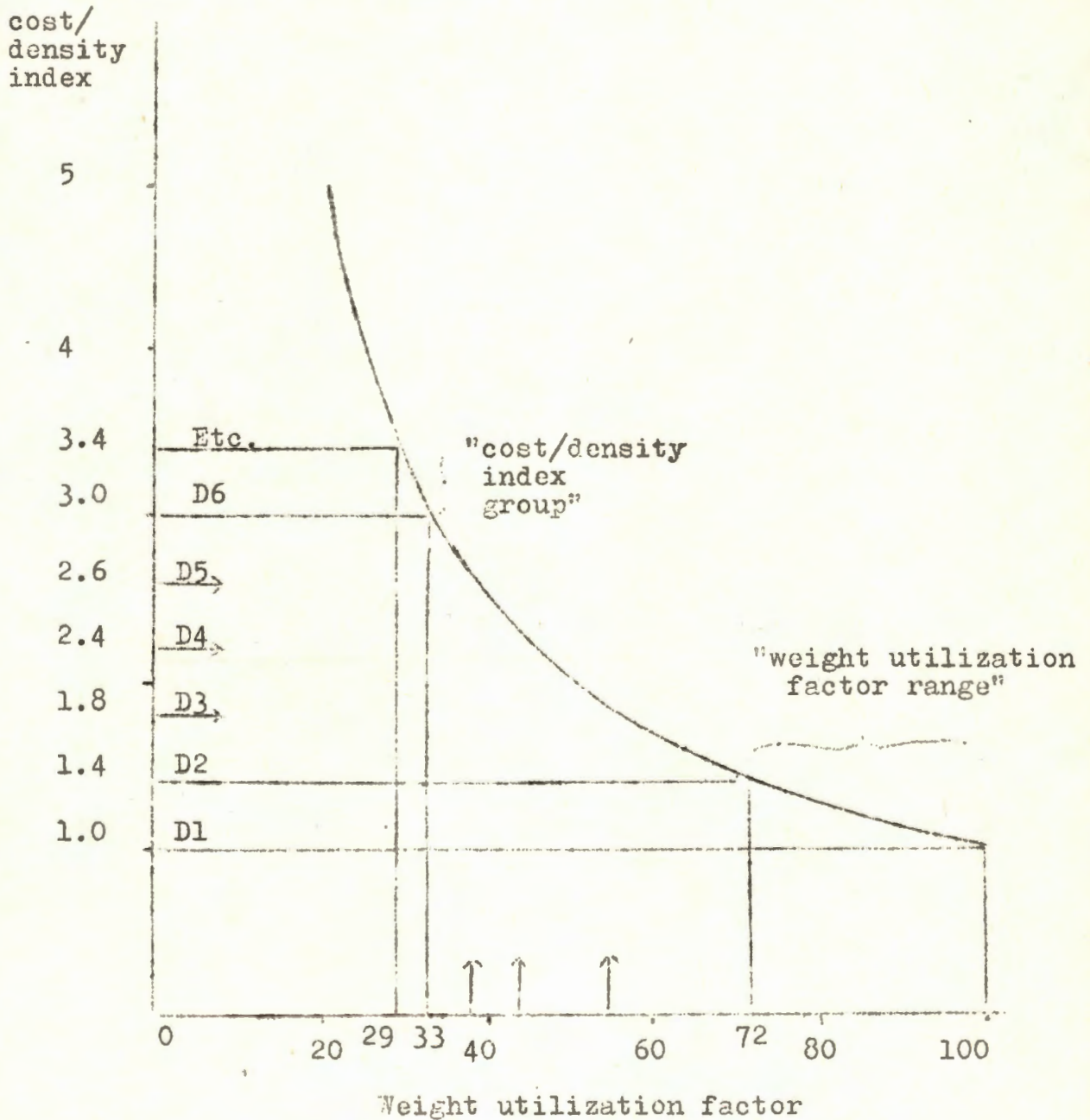


(Cf. A.J.E. Sorgdrager, op. cit.,
pages 229 to 230).

The influence of density of goods on the cost
of transportation:

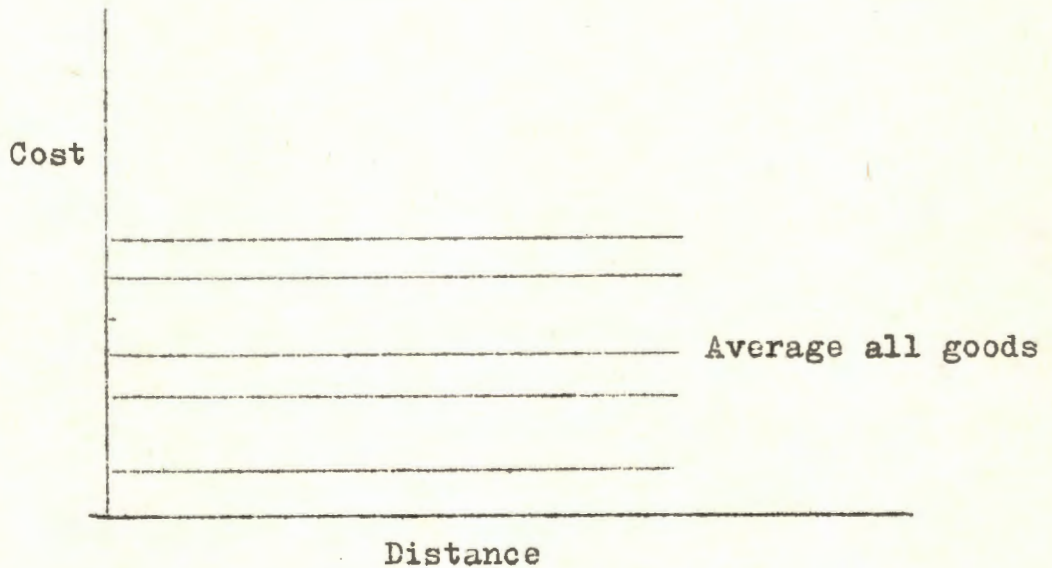


Graph indicating equal sized cost/density index
groups resulting in unequal sized weight
utilization factor ranges:

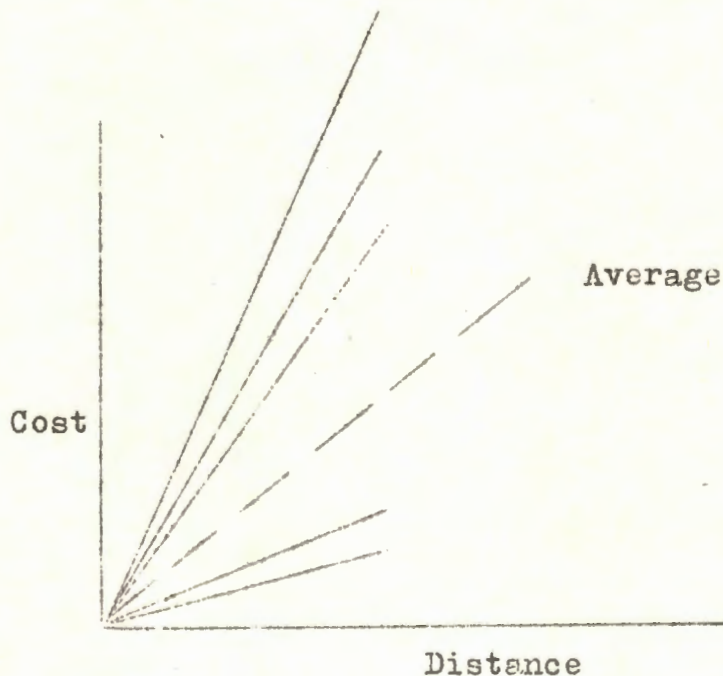


(only factor ranges 29 to 33 and 72 to 100
are shown).

- vi. Graph illustrating various levels of terminal costs per ton for different goods:



- vii. Graph illustrating variable cost of moving 1 ton of categories of goods:



(It should be noted that the relative positions of the average fixed cost per ton and the average variable cost as indicated in the respective graphs above, are functions of total cost divided by the unit of output (total tons or ton-miles).

ANNEXURE 6

PUBLIC SERVICE HAULIER ENQUIRY

- i. Questionnaire ¹⁾ (page A61)
- ii. Statistical information (page A71)

Footnote 1) This questionnaire was drafted by me and distributed by the Director of Census and Statistics of Rhodesia, who undertook the processing of the quantitative information obtained from the Public Service Hauliers in terms of the Census and Statistics Act of 1955.

CENTRAL STATISTICAL OFFICE,
P.O. BOX 8063, CAUSEWAY,
SALISBURY, RHODESIA.

19th April, 1967.

Dear Sir,

PUBLIC SERVICE HAULIERS ENQUIRY:

A detailed transportation study is being undertaken by the Ministry of Roads and Road Traffic. Unfortunately very little information is available on road transport and the Central Statistical Office has agreed to conduct an enquiry on their behalf.

You are earnestly requested to complete the following questionnaire and return it as soon as possible, but in any event by the 31st May, 1967. Information is sought mainly for the calendar years 1965 and 1966 but if this is not available, figures relating to your financial years ending 1965 and 1966 will be acceptable. Where possible, actual figures should be provided. If actual figures are not available, then I would be grateful if you would make the best estimates possible, indicating which figures are estimates by showing the letter E after them.

This information is being collected in terms of the Census and Statistics Act of 1955, as modified and adapted, and the details in respect of individual returns are strictly confidential and will not be revealed to anyone outside the Central Statistical Office without a specific instruction from the respondent concerned. However, as the replies to Questions 8, 9, 10 and 11 will be in narrative form and therefore will not be capable of being summarised statistically, providing you do not raise any objection I propose detaching this sheet from the remainder of the questionnaire and handing it over to the Ministry of Roads and Road Traffic for their, and their consultants', perusal. You will note the name of your firm need not be shown anywhere on this page.

Yours faithfully,

for DIRECTOR OF CENSUS AND
STATISTICS:

1. Please indicate the number of vehicles owned and total net carrying capacity on the following dates:-

DATE	ARTICULATED Tractors	ARTICULATED Trailers		INDEPENDENT Trailers		GOODS Vehicles		TOTAL Vehicles	
	No.	No.	Tons	No.	tons	No.	tons	No.	tons
<u>31st Dec.</u>									
1963									
1964									
1965									
1966									

2. Please provide detailed information in respect of each vehicle owned as at 31st December, 1965 and 31st December, 1966 respectively, for the following categories:-

- (a) Articulated Tractors (b) Articulated Trailers
(c) Independent Trailers (d) Goods Vehicles

(If insufficient space is provided please use separate schedules).

YEAR ENDING 31st December, 1965.

Registration Number	Year Bought	Original Purchase Price	Miles Travelled In Year	Net carrying Capacity (LB.)	Permit Number
<u>Articulated Tractors:</u>					
TOTAL:	XXXX				
<u>Articulated Trailers:</u>					
TOTAL:	XXXX				
<u>Independent Trailers:</u>					
TOTAL:	XXXX				
<u>Goods Vehicles:</u>					
TOTAL:	XXXX				

YEAR ENDING 31st December, 1966.

Registration Number	Year Bought	Original Purchase Price	Miles Travelled In Year	Net carrying Capacity (LB.)	Permi Numbe
<u>Articulated Tractors:</u>					
TOTAL:	XXXX				
<u>Articulated Trailers:</u>					
TOTAL:	XXXX				
<u>Independent Trailers:</u>					
TOTAL:	XXXX				
<u>Goods Vehicles:</u>					
TOTAL:	XXXX				

3. Tonnage of Goods Carried: If exact figures are not available, please estimate.

	Year End 31.12.1965.	Year End 31.12.1966.
	Tons	Tons
a. Maize and maize products		
b. Tobacco		
c. Raw sugar		
d. Livestock		
e. Coal/Coke		
f. Asbestos		
g. Chrome		
h. Limestone		
i. Other Minerals: (Specify)		
j. Petrol, Oil and Lubricants		
k. Fertiliser		
l. Sand, stone and gravel		
m. Cement		
n. Other Building materials		
o. Machinery		
p. Household removals		
q. General Goods: (Specify where possible)		
TOTAL:		

4. Do you undertake any of the following services in addition to transportation? (Please mark with an X in the space provided, if applicable).

1. Storage of Goods

2. Repair of own Vehicles

3. Other Services (Specify):

i. _____

ii. _____

iii. _____

5. Expenditure:

ITEM	Year Ending 31.12.65.	Year Ending 31.12.66.
<u>Direct Transport Costs:</u>		
Petrol and Oil,		
Tyres and Tubes ,		
Maintenance & Repairs .		
Licences		
Insurance		
Salaries/Wages (Employees on Vehicles)		
Other (specify) _____		
TOTAL DIRECT COSTS:		
<u>Overhead Costs:</u>		
Depreciation on vehicles		
Other overheads (e.g. de- preciation on other equipment, buildings, improvements; other salaries and wages, etc. Taxes and dividends should not be included).		
TOTAL OVERHEAD COSTS:		
TOTAL COSTS:		

6. Total miles done and unit cost by type of vehicle: Year ending 31.12.1966.

TYPE	MILES DONE	DIRECT COST PER MILE	TOTAL COST PER MILE
Articulated Tractors			
Articulated Trailers			
Independent Trailers			
Goods Vehicles			

Note: Any detailed cost breakdown by vehicle type (e.g. 5 tons, 10 tons, etc.) would be most welcome. Please supply separately.

7. Tariffs: How do you arrive at your tariffs?
(Please mark with an X in the appropriate box).

1. Based on Cost Calculations



2. Based on Railway Tariffs (compulsory)



3. Based on Railway Tariffs (not compulsory)



4. Other (specify):

Date Signature

S/167/20.

March, 1967.

8. Transport Route/Area: Do you consider the transportation route or area allocated to you as sufficient for the economic utilization of your vehicles? (Please mark with an X).

YES

NO

If "No", how should it be changed and why?

9. Do you consider the present system of "Public Service Haulage" regulations and controls as adequate? What improvements would you suggest?

10. Should stricter controls be instituted on "private hauliers" and why?

11. Any other remarks on competition in transportation from:-

- a. Railways
- b. Road Motor Services
- c. Commercial vehicles (own account)
- d. Farm vehicles (own account)
- e. Farm vehicles (Syndicates)
- f. Other Public Service Hauliers.

S/168/20.
March, 1967.

PUBLIC SERVICE HAULIERS: -(Excluding Road Motor Services)

Statistical Information:

A questionnaire was drawn up and sent to 110 Public Service Haulier organizations in Rhodesia for completion ¹⁾

The response obtained from Public Service Hauliers was most satisfactory. Although only a 50% response was obtained in terms of the number of questionnaires the response in terms of the number of vehicles varied between 41.7% and 90.6% for different types of vehicles. The Public Service Hauliers who did not respond to the questionnaire enquiry are mainly those who operate relatively small transportation businesses in rural areas.

- . The tables on pages A72 to A76 reflect the statistical information obtained from the 55 questionnaires. It should be noted that the information in the tables does not reflect the total picture for the 55 hauliers concerned, since some of these hauliers did not respond to all the questions put forward.

Footnote:

- ¹⁾ The Central Statistical Office undertook to collect and process the information required in the questionnaires in terms of the Census and Statistics Act of 1955, as modified and adapted.

Public Service Vehicles and Carrying Capacities (Based on 55 responses) 1)

as at 31st December	Articulated Trailers		Independent Trailers		Goods Vehicles		Total Carrying Vehicles 2)		Average Carrying Capacity Carrying Vehicles		Carry Vehicles 3)	
	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.	No.	Tons.
1963	283	527	4827	226	1673	4331	1316	10,331	8.23 tons	0%	0%	0%
1964	285	553	4858	242	2272	4758	1353	11,888	8.79 tons	2.8%	2.8%	9.76%
1965	294	557	4971	244	2328	5961	1353	13,260	9.80 tons	2.8%	2.8%	22.43%

- 1) The Roads Service Board indicated that there were 2304 Public Service Vehicles in Rhodesia. The total no. of P.S.V. vehicles covered by the responses was 1647 for the year 1965. Based on the number of vehicles, a 71.5% response was obtained.
- 2) Carry vehicles are articulated trailers, independent trailers and goods vehicles.
- 3) % Growth is indicated, based on 1963 information.

It is significant to note that although there was only a 2.8% increase in the number of total carrying vehicles from 1963 to 1965, the net carrying capacity increase for the same period was 22.43%. This increase in carrying capacity is significant as regards increased competition with the Rhodesia Railways.

FREQUENCY DISTRIBUTION SHOWING NUMBERS OF
PUBLIC SERVICE VEHICLES BY NET CARRYING
CAPACITY 1965:

<u>Net Carrying Capacity lbs.</u>	<u>Articulated Trailers</u>	<u>Independent Trailers</u>	<u>Goods Vehicles</u>
0 - 5,000	-	-	44
5001 - 10,000	11	26	107
10,001 - 15,000	179	108	153
15,001 - 20,000	234	91	97
20,001 - 25,000	42	12	100
25,001 - 30,000	8	2	34
30,001 - 35,000	7	2	15
35,001 - 40,000	59	1	-
Over 40,000	<u>13</u>	<u>-</u>	<u>8</u>
TOTAL:	<u>553</u>	<u>242</u>	<u>558</u>

- A74 -
TONNAGES OF GOODS CARRIED BY 37 PUBLIC SERVICE

HAULIER FIRMS:

GOODS DESCRIPTION	Year ending		Year ending	
	31 - 12 - 65		31 - 12 - 66	
	Tons	Firms	Tons	Firms
Maize & Maize Products	141,330	32	212,969	32
Tobacco	116,087	20	94,155	19
Raw Sugar	Nil		Nil	
Livestock	17,576	11	25,266	14
Coal/Coke	48,127	26	69,256	25
Asbestos	26,515	3	29,913	3
Chrome	55,311	4	45,202	4
Limestone	25,140	9	25,805	9
Other Minerals	107,867	11	234,207	11
Petrol, Oil & Lubricants	168,956	13	154,474	14
Fertilizer	126,251	27	137,237	28
Sand, Stone & Gravel	211,120	25	234,629	26
Cement	45,177	24	56,957	24
Other Building Materials	134,147	25	158,618	25
Machinery	4,519	19	4,413	18
Household Removals	17,231	13	17,720	14
<u>General Goods - Total</u>	704,767		637,082	
(Cotton	(1,606)	2	(3,343)	3
Milk	(7,550)	4	(9,030)	4
Fruit/Vegetables	(79)	2	(385)	2
Beer/Wine/Mineral Waters	(71,200)	1	(75,579)	1
Acid	(7,335)	1	(13,415)	2
Firewood	(178)	1	(194)	1
Paper & Paper Pulp	(6,000)	1	(6,000)	1
Insecticides	(500)	1	(300)	1
Game Meat	(-)		(133)	1
Other General Goods)	(610,319)	33	(528,653)	33
Total All Goods:	1,950,121	37	2,137,903	37

PUBLIC SERVICE HAULIERS: Expenditure Analysis:

Of the 55 questionnaires returned the total expenditure reported was as follows:

Expenditure	Year Ending 31-12-65	No. of Firms	Year Ending 31-12-66	No. of Firms
	£ (1)		£ (1)	
Total Direct Transport Cost	2,003,969	47	2,129,640	50
Total Overhead Costs	1,189,527	43	1,255,049	45

It should be noted that total overhead costs for 1965 and 1966 reported by 43 and 45 firms respectively were more than 50% of the total direct transport costs reported by 47 and 50 firms respectively.

Direct transport costs included the following items:-

Tyres and tubes, maintenance, repairs, fuel, licences, insurance, salaries and wages of employees on vehicles, etc.

Overhead costs included:-

Depreciation on vehicles and other overheads such as depreciation on other equipment, building improvements, other salaries and wages, etc. -(taxes and dividends excluded.)

(1) Rhodesian currency has been used.

PUBLIC SERVICE HAULIERS

Average variable and total cost in pence per mile and pence per ton-mile 1) also indicating
average fixed cost per ton:

Firms	No. of Vehicles	Average Carrying Capacity	Average Variable Cost per mile	Average Total Cost per mile	Average Cost per ton-mile		Average Fixed Cost per ton	No. of Vehicles
					Variable	Total		
5 Largest	843	8.9	25.7	44.3	2.88 ^d	4.98 ^d	139 ^d	843
Next 5	193	10.5	33.1	43.7	3.15 ^d	4.16 ^d	139 ^d	193
Next 5	81	10.3	17.8	30.2	1.73 ^d	2.95 ^d	139 ^d	81
Total Vehicles = 1117								

- 1) These costs are based on the statistical information collected by the Central Statistical Office - Salisbury. The costs of the 15 largest Public Service Haulier firms only were used in the above cost calculations. These firms combined owned 1117 vehicles which constituted 47% of all Public Service Haulier vehicles.

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ANNEXURE 7

Agricultural crop estimates.

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ANNEXURE 8

The demand for the internal transportation
of goods in Rhodesia.

THE DEMAND FOR THE INTERNAL
TRANSPORTATION OF GOODS IN RHODESIA:

In order to establish the product quantities that could be moved by rail instead of by road over distances exceeding 80 miles, which is the average break-even point between road and rail (refer chapter 7), an attempt was made to establish the potential demand for rail and road transportation of various categories of goods specifically in the agricultural sector of the economy for the calendar year 1965.

This information on demand for rail and road transportation also serves as a practical demonstration of the information which can be collected for the transportation intelligence system proposed (refer chapter 6).

1. Tonnage produced/consumed and despatched/received:

It is essential that statistical information be available as regards the output/input of the agricultural sector. All output/input statistics have to be converted to a common measure to facilitate a transport demand analysis. In this study exclusive use is made of the short-ton as the common measure.

2. Distances between production and Consumption centres:

For purposes of determining transportation capacity requirements it is also essential that the distances be determined over which the goods have to be transported to bridge the gap between the producers and the consumers. A knowledge of producer and consumer locations is, therefore, essential.

With the above information at hand goods flow tables can be drawn up in respect of given products.

Based on information which was provided by the Ministry of Agriculture in Rhodesia in respect of maize, tobacco and beef movements from producing areas to consumption areas, I have established the relative distances from the producing areas, viz., the intensive conservation areas (I.C.A.'s) to the consumption areas.

The principle followed in establishing the relative distances was first of all to locate the nearest possible railhead to the producing area. The distance from the railhead to the consumption area was then established from the Rhodesia Railways - Official Tariff Book, whilst the average distance by road from the producing area to railhead was determined from official maps of conservation areas.

Absolute accuracy cannot be claimed as regards road distances since the distances are indicative of the distances from the approximate centres of the conservation areas concerned. From this information on tonnages and distances ton-mile calculations followed.

Goods-flow tables were prepared in respect of maize, tobacco and cattle, but due to the bulkiness of these tables only summaries of the relative information are provided.

These tables are based on actual tonnages produced but rail and road tonnages have been estimated and are, therefore, only indicative of the potential demand for these respective mediums of transport. These potential demands can be compared with actual movements by rail or road in order to establish whether the transportation mediums in fact obtained their share of the possible demand. As regards cattle movements it should be observed that a special allowance was made for the fact that cattle could often walk to the nearest abattoir; where the average road distance was 35 miles or less, no allowance was made for transportation demand. (This figure of 35 miles was regarded as a conservative one and the ton-mile effect on the total cattle transportation should be relatively insignificant).

The above mentioned products are dealt with separately in the following paragraphs:-

Transportation of maize in short tons:

Table I:

Description of Movement	Total Demand	Rail Transport	Road Transport
Between Depots and Consumption areas	236,700	236,700	-
ICA's to Depots (European)	312,110	-	312,110
ICA's to Depots (African)	52,500	-	52,500
Rail Transport (other)	27,119	27,119	-
Total:	628,429	263,819	364,610

A study of Table I reveals that all maize produced can be moved by road. The road demand for maize transport, therefore, must be equal to the output of maize. It has been assumed that all between-depot-movements should be transported by rail since depots are situated at railheads, and distances are generally over 80 miles.

Ton-mile transportation demand:

The following table provides a summary of maize movements from grain marketing board depots to consumption areas:-

Table II:

From G.M.B. Depots To	Demand Tons	Rail Ton- Miles	Average Miles Per Ton
Aspindale	107,100	7,191,900	67
Bulawayo	81,000	24,638,200	304
Gwelo	21,400	3,866,800	181
F.E. Victoria	20,200	6,924,800	343
Umtali	7,000	920,000	131
Total:	236,700	43,541,700	184

Table III:

MAIZE MOVEMENTS FROM VARIOUS I.C.A.'s TO NEAREST DEPOTS:

Moved from I.C.A.'s to G.M.B. depot at	Demand Tons	Road Ton-Miles	Average Miles Per Ton Road Transport
Norton	7,600	114,000	15
Hartley	35,370	773,330	22
Gatooma	19,930	578,550	29
Que Que	3,175	79,725	21
Gwelo	7,140	221,905	21
Ft. Victoria	2,495	116,245	47
Umtali	4,030	209,200	52
Rusape	11,140	333,850	30
Marandellas	4,660	88,510	19
Aspindale	5,220	285,550	55
Cleveland Dam	27,510	811,900	26
Bulawayo	1,040	65,720	63
Banket	23,720	531,500	24
Aspindale	8,770	562,990	64
Sinoia	8,900	178,000	20
Lions Den	40,850	1,455,000	36
Selby	6,920	138,400	20
Passaford	4,000	80,000	20
Concession	28,920	561,800	19
Whitecliffe	3,000	60,000	20
Glendale	10,000	150,000	15
Simoonna	6,000	108,000	18
Bindura	23,520	942,650	40
Shamva	18,200	273,000	15
Total:	312,110	8,709,125	

Average Miles Per Ton = 28 miles.

For all practical purposes Table III above could be regarded as indicative of the demand for movement by road, since the Railways can only be used in isolated instances and then only over relatively short average hauls. For total demand purposes 312,110 tons and 8,709,125 ton-miles will, therefore, be used as representing road transport.

A African maize deliveries to grain marketing board depots were 52,500 tons. Assuming an average road haulage distance of 28 miles (based on an average distance per ton for European maize deliveries) a demand of 1,470,000 ton-miles can be calculated.

Table IV:

SUMMARIZED DEMAND FOR ALL MAIZE - MOVEMENTS:

DESCRIPTION	Rail		Road	
	Tons ¹⁾	Ton/miles	Tons	Ton/mile
Table II.	236,700	43,541,700		
<u>Rail (Other)</u>		²⁾		
<u>(Balance)</u>	27,119	2,711,900		
Table III.			312,110	8,709,12
Paragraph above			52,500	1,470,00
Total Miles Per ton	263,819	46,253,600	364,610	10,179,12

1) The Railways actually moved 263,819 tons of maize and it is assumed that this represents the total demand for the transportation of maize.

2) Estimated at a conservative 100 rail-miles per ton.

Tobacco transportation: (Short Tons)

Table V: .

Description	Total Demand	Rail Transport "Demand"	Road Transpo.
I.C.A.'s to Salisbury	118,092	-	118,09
I.C.A.'s (via Rail)	100,526	100,526	-
Totals:	218,618	100,526	118,09

Tobacco produced and moved to Salisbury auction floors amounted to 118,092 tons. This output could have been moved direct from I.C.A.'s to Salisbury or to the nearest railhead by road. Of this output (118,092 tons) 100,526 tons could have been moved by rail. The total demand for rail transport is, therefore, ~~taken~~ as 100,526 tons.

Ton - mile transportation demand:

Table VI: .

DESCRIPTION	Rail Demand		Road Demand	
	Tons	Ton-Miles	Tons	Ton-Mil
I.C.A. to Salisbury	-	-	118,092	3,404,9
I.C.A. (via rail)	100,526	8,002,666		
Total:	100,526	8,002,666	118,092	3,404,9

Average miles per ton Rail = 80

Road = 29

Beef transportation:

Table VII:

SUMMARIZED DEMAND FOR INTERNAL BEEF
TRANSPORTATION IN RHODESIA FOR
THE CALENDAR YEAR 1965:

Rail Demand		Road Demand	
Tons	Ton-Miles	Tons	Ton-Miles
837	136,091	13,620	1,336,395
23,483	3,047,059	15,790	692,662
24,364	3,557,550	16,242	811,342
67	9,058	3,054	304,368
1,243	164,869	1,513	106,815
8,957	850,424	9,794	899,750
81	5,670	13,544	985,150
130	8,060	1,790	195,896
9,576	1,693,489	1,878	244,140
68,738	9,472,270	77,225	5,576,518

Table VIII:

SUMMARIZED KNOWN POTENTIAL DEMAND FOR
INTERNAL DEMAND FOR THE AGRICULTURAL
SECTOR CALENDAR YEAR 1965:

PRODUCT	Rail		Road		Average Miles Per Ton	
	Tons	Ton-Miles	Tons	Ton-Miles	Rail	Road
Maize	263,819	46,253,600	364,610	10,179,125	175	28
Tobacco	100,526	8,002,666	118,092	3,404,940	80	29
Beef	68,738	9,472,270	77,225	5,576,518	138	72
Total	433,083	63,728,536	559,927	19,160,583	147	34

% Total tons 44% 56%

% Total ton-miles 76% 24%

From the above table it is clear that as regards the summarized potential demand the Railways could transport 44% of the total demand for the above products which is 76% of the total ton-miles demand.

Estimate of the unknown demand for other
agricultural sector products:

According to information which was not published but was released specifically for this study by the Central Statistical Office, the total output of the agricultural sector was as follows:-

Table IX:

AGRICULTURAL PRODUCTION FOR THE CALENDAR YEAR 1965:
(Short - tons):

Product Description	Tonnage Produced	Production Tonnage Used for Transport Demand	Shortfall Not Covered in "Demand"
Cattle	221,759	145,473	- 76,286
Pigs	5,789	-	- 5,789
Other Animals	1,537	-	- 1,537
Milk	87,148	-	- 87,148
Cream	159	-	- 159
Butterfat	442	-	- 442
Wood	23,085	-	- 23,085
Fruit	30,047	-	- 30,047
Tobacco	121,662	118,092	- 3,570
Maize	344,514	364,610	+ 20,096
Other Grains	9,145	-	- 9,145
Cotton	17,909	-	- 17,909
Sugar Cane	168,154	-	- 168,157
Groundnuts	1,896	-	- 1,896
Other Industrial Produce	2,103	-	- 2,103
Potatoes (Summer)	8,710	-	- 8,710
Potatoes (Winter)	16,068	-	- 16,068
Other Vegetables	16,440	-	- 16,440
Totals:	1,076,567	628,175	- 448,392

1) Of this shortfall: i.e. 76,286 tons of cattle, + 39,500 represents cattle slaughtered at centres other than Salisbury, Bulawayo, Umtali, and Fort Victoria. The total cattle slaughtered in Rhodesia came to 369,900 head, say, 184,950 tons- Agricultural Census 1965, Table 4.

Based on the total production tonnages for cattle, tobacco and maize provided in Table IX above, viz., 628,175, it was found that the total potential demand for these products came to 993,010 tons. 1)

A transportation tonnage ratio can, therefore, be calculated as follows:-

$$\begin{aligned}\text{Ratio:} \\ &= \frac{\text{Potential demand}}{\text{Production}} \\ &= \frac{993,010}{628,175} \\ &= 1.58\end{aligned}$$

The potential demand for the total shortfall of 448,392 tons (products not covered in the above demand analysis) indicated in Table IX, if multiplied by the ratio of 1.58, yields a potential demand of 708,459 tons. A conservative estimate would be 500,000 tons demand. This demand has to be allocated to rail and road respectively. Using the %'s calculated in Table VIII.

- 1) Table VIII indicated a rail-tons demand of 433,083 tons and a road-tons demand of 559,927 tons, giving a total known demand of 993,010 tons.

viz., 44% being rail transport and 56% being road transport, we arrive at a total estimated demand of 220,000 rail - tons and 280,000 road-tons.

Using the average miles per ton figures calculated in Table VIII, viz., 147 miles per ton for rail transport and 34 miles per ton for road transport, the calculated ton-miles would be as follows:-

Rail - ton miles = 32,340,000

Road - ton miles = 9,520,000

Final Summary:

The total internal transportation demand for agricultural production for the calendar year 1965 was:-

SOURCE	Rail		Road	
	Tons	Ton-Miles	Tons	Ton-Miles
Table No.	433,083	63,728,536	559,927	19,160,583
Estimate above	220,000	32,340,000	280,000	9,520,000
Totals:	653,083	96,068,536	839,927	28,680,583
Rounded - off	650,000	96,000,000	840,000	29,000,000

* The above analysis provides an indication of the approach which could be adopted to establish the demand for various types of transport. The above figures are based on goods-flow tables in respect of maize, tobacco and beef.

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ANNEXURE 9

Overall cost of goods traffic transported
by the Rhodesia Railways for the year
ended 30th June, 1965.

OVERALL COST OF GOODS TRAFFIC TRANSPORTED BY THE RHODESIA RAILWAYS FOR THE YEAR ENDED 30th JUNE, 1965:
(Source - Rhodesia Railways internal cost document.)

NATURE OF COST	DIRECT COST	FULL COST	REMARKS
<u>OPERATING OR RUNNING COST:</u>			
Vehicle Haulage Cost	4,285,244	4,628,121	These costs were incurred in order to produce a Railways output of 5,365,190,000 ton-miles.
Train Operating General	2,343,043	4,990,628	
Vehicle Cost	2,013,984	2,094,719	
Guards Vans	439,170	644,218	
Misc. and Engineering	397,548	484,514	
Empty Running	3,870,072	5,226,446	
Free Haul Traffic	534,726	1,200,717	
Total Running Cost	13,913,787	19,269,364	
Unit Cost per Ton-mile	0.6224d	0.8320d	
<u>TERMINAL COST:</u>			
Shunting and Yard Cost	2,372,820	3,276,780	In respect of 14,061,929 tons hauled.
Traffic Cost	976,468	1,732,282	In respect of 14,061,929 tons hauled.
Handling Cost	1,224,725	1,444,956	In respect of 2,048,978 tons handled.
Total Terminal Cost	4,574,013	5,454,018	
<u>ADMINISTRATION AND POLICY</u>			
Cost per ton-mile	0.3441d		

TERMINAL COSTS:

Cost per Ton:

Shunting and Yard Cost 40.49d
Traffic Cost 14.06d
Handling Cost 143.45d
Terminal Cost Per Ton 198.00d

55.92d
29.56d
169.25d
254.73d

Unit Costs Used in Break-even Analysis:

Operating & Running Cost (Full Cost) = 0.8620d per ton-mile.
Administration and Policy Cost = 0.3441d per ton-mile.
Total Running Cost per ton-mile = 1.2061d

Terminal Cost per ton = 254.73d

ANNEXURE 10

Rhodesia Railways internal goods transportation
for the calendar year 1965:

- i. Tonnages transported of various categories of goods (page A96).
- ii. Control station code and name list (page A97).
- iii. Tonnages of goods forwarded and received by control stations (page A99).
- iv. Tonnages, mileages and ton-mile transportation between control stations (page A100).
- v. Total tonnages and ton-mile transportation from control stations (page A155).

Rhodesia Railway internal goods transportation
for the calendar year 1965:

The control station code and name lists on pages 97 and 98 provide a complete list of control station codes and names and should be used for identifying control stations in all the following tables. Transportation from a single control station could in fact represent transportation from a few small stations/sidings in the vicinity, since invoices are prepared at control stations which are regarded as the despatch points. Relative mileages between all control stations are, therefore, not absolutely accurate.

The tables on pages A100 to A154 provide details relative to tonnages, mileages and ton-mile transportation in respect of all internal goods transportation between all the control stations in Rhodesia. The detailed calculations relative to tonnages and ton-mile transportation were necessary in order to establish the importance of internal goods transportation to the Railways. (Refer also chapter 7).

The basic information of station codes and tonnages used in the tables was obtained from a special computer tabulation of approximately 400 pages prepared by the Railways. Mileages between control stations were obtained and calculated from the Official Tariff Book. Ton-mile calculations were done manually.

RAIL TRANSPORTATION OF GOODS BY THE RHODESIAN RAILWAYS FOR THE CALENDAR YEAR ENDING 31st DECEMBER, 1965.
(Tonnage transported)

Description of goods	A Total Rhodesia Railways 1) (nearest 10,000 tons)	B Internal transport Rhodesia only 2)	% Total (Rhodesia only)	C From Rhodesia to Zambia and Botswana	D In Zambia to Rhodesia/ Zambia, Botswana	E Balance of railway transport imports/exports in transit 3)	F Tonnage unable to group
General goods (other)	3,723,000	716,469	25.4%	184,497	397,647	2,424,387	
Maize	678,000	263,819	9.3%	2,142	223,779	143,072	
Meal		45,188	1.6%				
Tobacco	219,000	24,005	.8%	682	2,004	192,309	
Fertilizer	550,000	253,488	9.0%	59,929	6,632	229,951	
Sugar (raw)	222,000	58,437	2.1%	12,413	22,590	128,460	
Cement	321,000	132,348	4.7%	17,420	130,237	40,995	
Petrol, oil etc.	553,000	240,440	8.5%	120,999	-	191,561	
Coal and coke	2,591,000	904,530	32.0%	1,033,990	45	652,435	
Minerals	5,604,000	186,557	6.6%	19,355	2,398,888	2,998,300	
Livestock 4)	296,000						296,000
Total tons	14,757,000	2,825,281	100%	1,451,427	3,181,922	7,002,370	296,000
plus:							
Railways stores free							
General goods	406,000						
Coal and coke	730,000						
Total hauled	15,893,000						

1) Source of information: Trend - Rhodesia Railways - Digest of Performance, March, 1967.

2) Extracted from a computer tabulation produced by the Railways on the internal transportation of goods for the year ending 31st December, 1965.

3) The tonnage shown in this column is derived at after deduction of the total of B + C + D from the figures given in column A.

4) Livestock transportation in columns B, C, D, E, could not be determined separately and should be assumed to be included in B, C, D, E, respectively for "General goods (other)".

CONTROL STATION CODE AND NAME LIST

CONTROL STATION CODE	CONTROL STATION NAME
048	Umtali
052	Odzi
056	Inyazura
058	Rusapi
061	Headlands
063	Macheke
066	Marandellas
070	Msasa
071	Salisbury
075	Salisbury R.M.S.
084	Mt. Hampden
093	Darwendale
097	Banket
100	Sinoia
101	Lion's Den
106	Concession
108	Glendale
113	Bindura
117	Shamva
127	Norton
134	Hartley
137	Gatooma
140	Umniati
141	Que Que
145	Hunters Road
149	Gwelo
156	Selukwe
161	Lalapansi
165	Umvuma
169	Chatsworth
171	Fort Victoria
173	Somabula
176	Shangani

CONTROL STATION
CODE

CONTROL STATION NAME

181	Heavy Junction
185	Bala Bala
190	Gwanda
192	Colleen Bawn
194	West Nicholson
195	Cement
199	Bulawayo
206	Nyamandhlovu
209	Sawmills
217	Dett
223	Bankie
232	Victoria Falls
407	Marula
411	Plumtree
475	Unknown
506	Bannockburn
508	Shabani
514	Ingezi
520	Rutenga
522	Mbizi
533	Triangle
536	Chiredzi

RHODESIA RAILWAYS INTERNAL TRAFFIC ONLY
TONNAGES OF GOODS FORWARDED AND RECEIVED
BY CONTROL STATIONS

Control Station	Tonnage Forwarded	Tonnage Received	Total Tons Handled
048	307843	76460	384303
052	1233	9960	11193
056	22314	14274	36588
058	14323	22525	36848
061	3513	9071	12584
063	3809	8999	12808
066	8514	21025	29539
070	176624	125104	301728
071	297221	537844	835065
075	77	328	405
084	29048	11076	40124
093	18305	15144	33449
097	22602	42663	65265
100	23040	94370	117410
101	39716	27089	66805
106	35101	32471	67572
108	92432	7976	100408
113	30305	16409	46714
117	16857	10442	27299
127	12232	14144	26376
134	37175	35944	73119
137	31195	55397	86592
140	72	6207	6279
141	91499	454004	545503
145	2494	2269	4763
149	71160	206697	277857
156	22123	8227	30350
161	7336	1016	8352
165	1875	4428	6303
169	1628	10506	12134
171	9491	75229	84720
173	783	873	1656
176	187	5790	5977
181	1441	2767	4208
185	265	6110	6375
190	5873	26834	32707
192	120069	25640	145709
194	2488	19445	21933
195	22784	83255	106039
199	180619	364936	545555
206	144	4502	4646
209	2169	1091	3260
217	16481	13904	30385
223	945769	19945	965714
232	285	23141	23426
407	99	5004	5103
411	465	11824	12289
475	101	876	977
506	189	1748	1937
508	6829	73490	80319
514	4333	7060	11393
520	77	8613	8690
522	752	5728	6480
533	38583	97262	135845
536	43339	58145	101484
TOTAL:	2825281	2825281	5650562

From: Umtali (Code 048):

To Control Stations	Tons	Miles	Ton-Miles
048	7375	10	73750
052	448	20	8960
056	1570	48	75360
058	4653	62	288486
061	147	83	12201
063	89	104	9256
066	222	125	27750
070	2144	166	355904
071	161139	170	27393630
075	17	170	2890
084	1425	186	265050
093	87	215	18705
097	8350	241	2012350
100	11778	257	3026946
101	327	274	89598
106	68	214	14552
108	10	223	2230
113	214	243	52002
117	8	259	2072
127	104	198	20592
134	3969	249	988281
137	1087	269	292403
140	1	297	297
141	1838	317	582646
149	22622	358	8098676
156	111	381	42291
161	2	386	772
165	2	412	824
169	48	450	21600
171	5094	461	2450214
173	60	379	22740
176	2	401	802
181	2	451	902
185	42	486	20412
190	48	525	25200
192	45	542	24390
194	314	554	173956
199	56182	472	26517904
206	1	505	505
217	1272	637	810264
223	4397	682	2998754
232	42	765	32130
411	25	535	13375
506	2	428	856
508	791	442	349622
514	467	478	223226
520	162	535	86670
522	3465	555	1923075
533	5568	595	3312960
536	3	611	1833
Total:	307,843		82,769,858

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From: Odzi: (Code 052):

To Control Stations	Tons	Miles	Ton-Miles
048	753	20	15,060
056	123	28	3,444
058	4	42	168
063	1	84	84
070	9	146	1,314
071	154	150	23,100
101	6	254	1,524
137	170	249	42,330
171	1	461	461
199	12	452	5,424
Total:	1,233		92,909

From: Inyazura:

(Code 056):

To Control Stations,	Tons	Miles	Ton-Miles
048	1,874	48	89,952
052	78	28	2,184
058	13	14	182
061	14	35	490
063	14	56	784
066	2	77	154
070	18,866	118	2,226,188
071	1,228	122	149,316
097	3	193	579
101	3	226	678
106	4	166	664
127	1	150	150
134	1	201	201
137	29	221	6,409
156	1	333	333
171	36	433	15,588
181	1	403	403
192	71	494	35,074
199	70	424	29,680
223	1	634	634
506	1	380	380
508	1	394	394
536	2	563	1,126
Total:	22,314		2,562,043

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From: Musapi:

(Code 058):

To Control Stations	Tons	Miles	Ton-Miles
048	2068	62	128,216
052	224	42	9,408
056	231	14	3,234
058	12	5	60
061	308	21	6,468
063	74	42	3,108
066	36	63	2,268
070	3	104	312
071	6569	108	709,452
075	1	108	108
084	700	124	86,800
093	14	153	2,142
097	1	179	179
100	415	195	80,925
101	1053	212	223,236
106	3	152	456
108	20	161	3,220
113	4	181	724
117	1	197	197
127	53	136	7,208
134	11	187	2,057
137	1422	207	294,354
141	99	255	25,245
149	95	296	28,120
171	3	419	1,257
192	113	480	54,240
194	100	492	49,200
199	550	410	225,500
508	130	380	49,400
533	10	533	5,330
Total:	14,323		2,002,424

From: Headlands

(Code 061):

To Control Stations	Tons	Miles	Ton-Miles
048	1988	83	165,004
052	3	63	189
056	15	35	525
058	40	21	840
063	3	21	63
066	18	42	756
070	13	83	1,079
071	1170	87	101,790
093	2	132	264
100	6	174	1,044
101	41	191	7,831
134	140	166	23,240
137	50	186	9,300
199	24	389	9,336
Total:	3,513		321,261

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From: Macheke

(Code 063):

To Control Stations	Tons	Miles	Ton-Miles
048	2161	104	224,744
056	16	56	896
058	18	42	756
061	96	21	2,016
066	6	21	126
070	8	62	496
071	1201	66	79,266
093	1	111	111
097	1	137	137
101	18	170	3,060
134	22	145	3,190
137	7	165	1,155
141	1	213	213
199	252	368	92,736
520	1	431	431
Total:	3,809		409,333

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From: Marandellas (Code 066):

To Control Stations	Tons	Miles	Ton-Miles
048	1374	125	171,750
052	4	105	420
056	48	77	3,696
058	1166	63	73,458
061	121	42	5,082
063	314	21	6,594
070	79	41	3,239
071	3428	45	154,260
075	6	45	270
084	232	61	14,152
093	60	90	5,400
097	79	116	9,164
100	706	132	93,192
101	85	149	12,665
106	44	89	3,916
108	77	98	7,546
113	270	118	31,860
127	25	153	3,825
134	66	204	13,464
137	13	224	2,912
141	27	272	7,344
145	1	289	289
149	7	313	2,191
156	1	336	336
161	1	341	341
169	1	405	405
171	4	436	1,744
173	1	334	334
176	1	356	356
190	15	480	7,200
199	67	417	27,939
217	1	582	582
223	4	627	2,508
232	4	710	2,840
407	2	459	918
411	129	480	61,920
506	1	383	383
508	5	317	1,585
533	2	550	1,100
536	41	566	23,206
Total:	8,514		760,386

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From: Msasa (Code 070):

To Control Stations	Tons	Miles	Ton-Miles
048	10038	166	1,666,308
052	1439	146	210,094
056	2023	118	238,714
058	3047	104	316,888
061	1384	83	114,872
063	1669	62	103,478
066	2004	41	82,164
070	863	10	8,630
071	70495	4	281,980
075	13	4	52
093	592	49	29,008
097	3583	75	268,725
100	8807	91	801,437
101	4070	108	439,560
106	4235	48	203,280
108	955	57	54,435
113	4777	77	367,829
117	3264	93	303,552
127	1240	32	39,680
134	3959	83	328,597
137	4976	103	512,528
140	280	130	36,400
141	2680	151	404,680
145	315	168	52,920
149	3241	192	622,272
156	426	215	91,590
161	29	220	6,380
165	398	246	97,908
169	702	284	199,368
171	4188	315	1,319,220
173	39	213	8,307
176	34	235	7,990
181	66	285	18,810
185	564	320	180,480
190	29	359	10,411
192	331	376	143,256
194	701	388	271,988
199	7193	306	2,201,058
206	7	331	2,317
217	70	463	32,410
223	73	508	37,084
232	480	591	283,680
407	18	348	6,264
411	1229	369	453,501
506	75	262	19,650
508	1206	276	332,856
514	245	312	76,440
520	1392	369	513,648
522	77	389	29,953
533	5203	420	2,185,260
536	11850	445	5,273,250
Total:	176,624		21,291,162

From Salisbury (Code 071):

To Control Stations	Tons	Miles	Ton-Miles
048	27594	170	4,690,980
052	4779	150	716,850
056	4002	122	488,244
058	7726	108	834,408
061	4327	87	376,449
063	3934	66	259,644
066	6447	45	290,115
070	23715	4	94,860
084	707	16	11,312
093	3473	45	156,285
097	12650	70	885,500
100	27101	87	2,357,787
101	13896	104	1,445,184
106	14453	44	635,932
108	3336	53	176,808
113	7711	73	562,903
117	3908	89	347,812
127	1562	28	43,736
134	16272	79	1,285,488
137	20370	99	2,016,630
140	373	126	46,998
141	12167	147	1,788,549
145	1033	164	169,412
149	22949	188	4,314,412
156	749	211	158,039
161	452	216	97,632
165	1052	242	254,584
169	1683	280	471,240
171	6019	311	1,871,909
173	238	209	49,742
176	556	231	128,436
181	858	281	241,098
185	823	316	260,068
190	332	355	117,860
192	635	372	236,220
194	1070	384	410,880
195	15	288	4,320
199	23907	302	7,219,914
206	605	327	197,835
209	23	357	8,211
217	209	459	95,931
223	556	504	280,224
232	565	587	331,655
407	403	344	138,632
411	92	365	33,580
475	612	unidentified station	
506	131	258	33,798
508	1698	272	461,856
514	234	308	72,072
520	154	365	56,210
522	65	385	25,025
533	3628	416	1,509,248
536	5372	441	2,369,052
Total:	297,221		41,131,569

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From: Salisbury R.M.S. (Code 075):

To Control Stations	Tons	Miles	Ton-Miles
048	1	170	170
070	9	4	36
093	31	45	1,395
097	6	70	420
137	1	99	99
156	21	211	4,431
171	1	311	311
190	1	355	355
199	6	302	1,812
Total:	77		9,029

- All0 -

From: Mt. Hampden: (Code 084):

To Control Stations	Tons	Miles	Ton-Miles
048	419	186	77,934
052	42	166	6,972
056	1574	138	217,212
058	699	124	86,676
061	59	103	6,077
063	324	82	26,568
066	1090	61	66,490
071	5806	16	92,896
093	84	29	2,436
097	663	55	36,465
100	530	71	37,630
101	134	88	11,792
106	101	28	2,828
108	23	37	851
113	452	57	25,764
117	851	73	62,123
127	5	44	220
134	755	95	71,725
137	4037	115	464,255
141	247	163	40,261
149	230	204	46,920
156	10	227	2,270
165	15	258	3,870
169	54	296	15,984
171	1845	327	603,315
173	1	225	225
176	15	247	3,705
181	18	297	5,346
192	330	388	128,040
194	168	400	67,200
195	24	304	7,296
199	7898	318	2,511,564
407	3	360	1,080
411	84	381	32,004
508	52	288	14,976
514	42	324	13,608
520	60	381	22,860
533	84	432	36,288
536	220	457	100,540
Total:	29,048		4,954,266

- Alll -

From: Darwendale: (Code 093):

To Control Stations	Tons	Miles	Ton-Miles
048	2	215	430
058	3	153	459
070	26	49	1,274
071	2768	45	124,560
075	1	45	45
097	5	26	130
100	5	42	210
101	1	59	59
137	39	144	5,616
141	3	192	576
149	14916	233	3,475,428
171	514	356	182,984
199	3	337	1,011
217	19	502	9,538
Total:	18,305		3,802,320

From: Banket: (Code 097):

To Control Stations	Tons	Miles	Ton-Miles
048	51	241	12,291
061	40	158	6,320
066	2	117	234
070	64	75	4,800
071	7575	71	537,825
084	4	55	220
093	638	26	16,588
100	134	16	2,144
101	11	33	363
108	1	92	92
113	4	112	448
127	1	99	99
134	7	150	1,050
137	1156	170	196,520
140	4	198	792
141	10	218	2,180
149	1749	259	452,991
156	1	282	282
165	1	313	313
171	4466	382	1,706,012
176	15	302	4,530
190	1	426	426
192	168	443	74,424
194	169	455	76,895
199	4438	373	1,655,374
411	125	436	54,500
508	842	343	288,806
514	127	378	48,006
520	84	436	36,624
533	420	487	204,540
536	294	512	150,528
Total:	22,602		5,436,217

From: Sinoia (Code 100):

To Control Stations	Tons	Miles	Ton-Miles
048	368	257	94,576
052	173	237	41,001
056	128	209	26,752
058	549	195	107,055
061	173	174	30,102
063	2	153	306
066	961	132	126,852
070	616	91	56,056
071	6309	87	548,883
075	37	87	3,219
084	904	71	64,184
093	1547	42	64,974
097	769	16	12,304
100	197	5	985
101	416	17	7,072
106	143	99	14,652
108	1	108	108
113	302	128	38,656
117	45	144	6,480
127	514	115	59,110
134	238	166	39,508
137	198	186	36,828
141	124	234	29,016
149	2747	275	755,425
156	7	298	2,086
161	1	303	303
165	1	329	329
169	38	367	13,946
171	1622	398	645,556
173	2	296	592
176	18	318	5,724
181	1	368	368
185	1	403	403
190	85	442	37,570
192	169	459	77,571
199	2381	339	926,209
217	1	554	554
407	1	431	431
506	5	345	1,725
508	489	359	175,551
514	4	395	1,580
520	36	452	16,272
533	337	503	169,511
536	375	528	198,000
Total:	23,040		4,438,385

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From: Lion's Den;

(Code 101):

To Control Stations	Tons	Miles	Ton-Miles
048	6	274	1,644
058	12	212	2,544
061	10	191	1,910
063	1	170	170
066	844	149	125,756
070	33	108	3,564
071	12007	104	1,248,728
084	30	88	2,640
093	36	59	2,124
097	84	33	2,772
100	280	17	4,760
101	41	5	205
113	92	145	13,340
127	343	132	45,276
134	6	183	1,098
137	1059	203	214,977
141	236	251	59,236
149	1285	292	375,220
165	15	346	5,190
169	131	384	50,304
171	9312	415	3,864,480
176	48	335	16,080
181	18	385	6,930
190	1	459	459
192	250	476	119,000
194	422	488	205,936
199	8549	406	3,470,894
232	20	699	13,980
411	518	469	242,942
506	134	352	47,168
508	351	366	128,466
514	127	402	58,293
520	495	459	227,205
533	1343	510	684,930
536	1577	535	843,695
Total:	39,716		12,091,916

- All5 -

From: Concession (Code 106):

To Control Stations	Tons	Miles	Ton-Miles
048	219	214	46,866
052	96	194	18,624
056	35	166	5,810
058	3	152	456
061	40	131	5,240
063	230	110	25,300
066	458	89	40,762
070	243	48	11,664
071	7335	44	322,740
084	608	28	17,024
093	67	57	3,819
097	6	83	498
100	44	99	4,356
106	1	5	5
108	3	9	27
113	162	29	4,698
117	689	45	31,005
127	21	72	1,512
134	32	123	3,936
137	753	143	107,679
149	8897	232	2,064,104
156	1	255	255
171	2807	355	996,485
176	2	275	550
181	36	325	11,700
185	2	360	720
190	155	399	61,845
192	216	416	89,856
194	383	428	163,924
199	10939	346	3,784,894
206	20	379	7,580
411	342	409	139,878
508	1	316	316
514	129	352	45,408
520	85	409	34,765
533	2	460	920
536	39	485	18,915
Total:	35,101		8,074,136

From: Glendale (Code 108):

To Control Stations	Tons	Miles	Ton-Mile
048	136	223	30,32
070	53508	57	3,049,95
071	8500	53	450,50
075	1	53	5
084	8	37	29
097	1	92	9
100	12632	108	1,364,25
106	4	9	3
113	3	20	6
117	11	36	39
127	10	81	81
137	1679	152	255,20
145	1	217	21
149	1820	241	438,62
156	19	264	5,01
171	128	364	46,59
185	43	369	15,36
190	1	408	40
194	85	437	37,14
199	12927	355	4,589,08
411	168	418	70,22
506	18	311	5,59
508	553	325	179,72
514	110	361	39,71
533	44	469	20,63
536	22	494	10,86
Total:	92,432		10,611,70

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From: Bindura (Code 113):

To Control Stations	Tons	Miles	Ton-Miles
048	8	243	1,944
056	3	195	585
058	2	181	363
066	20	118	2,360
070	103	77	7,931
071	11137	73	813,001
075	1	75	73
084	7	57	399
093	5	86	430
100	4	128	512
101	4	135	530
106	18	29	522
108	14	20	280
113	28	5	140
117	85	16	1,360
127	2	101	202
134	10	152	1,520
137	2237	172	384,764
140	107	200	21,400
141	160	220	35,200
149	501	261	130,761
156	7	284	1,988
169	2	353	706
171	2483	384	953,472
176	18	304	5,472
181	1	354	354
190	37	428	15,836
192	170	445	75,650
194	171	457	78,147
199	12584	375	4,719,000
232	1	668	668
411	122	438	53,436
506	20	331	6,620
508	17	345	5,865
514	70	381	26,670
520	61	438	26,718
533	84	489	41,076
Total:	30,305		7,415,954

From: Shamva (Code 117):

To Control Stations	Tons	Miles	Ton-Miles
058	1	197	197
066	865	234	205,412
070	218	93	20,274
071	9762	89	868,818
075	4	89	356
084	78	73	5,694
093	8	102	816
097	25	128	3,200
100	9	144	1,296
106	54	45	2,430
108	10	36	360
113	28	16	448
117	1	5	5
127	58	117	6,786
134	1	168	168
137	1743	188	327,684
149	192	208	39,936
156	3	300	900
165	2	331	661
169	1	369	369
171	745	400	298,000
185	7	384	2,688
192	5	461	2,305
199	2854	391	1,115,914
411	139	452	62,828
508	1	361	361
514	1	397	397
536	42	530	22,260
Total:	16,857		2,990,563

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From: Norton (Code 127):

To Control Stations	Tons	Miles	Ton-Mile
048	159	198	31,48
052	7	178	1,24
056	3	150	45
058	22	136	2,99
061	1	115	11
063	1	94	9
066	2	73	14
070	7	32	22
071	194	28	5,43
075	2	28	5
093	3	73	21
097	410	99	40,59
100	33	115	3,79
101	10	132	1,32
106	1226	72	88,27
108	18	81	1,45
113	68	101	6,86
117	20	116	2,32
134	5	51	25
137	42	70	2,94
141	48	118	5,66
149	6354	159	1,010,28
156	1	182	18
165	1	213	21
169	182	251	45,68
171	882	283	249,60
176	16	203	3,24
181	2	253	50
190	109	327	35,64
192	298	344	102,51
194	8	356	2,84
199	1043	274	285,78
217	1	439	43
223	4	484	1,93
411	1	337	33
506	1	230	23
508	768	244	187,39
514	46	280	12,88
520	127	337	42,79
533	40	388	15,52
536	62	413	25,60
Total:	12,232		2,219,58

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From: Hartley: (Code 134):

To Control Stations	Tons	Miles	Ton-Mil
048	387	249	96,3
052	7	229	1,6
058	1	187	1
066	14	124	1,7
070	696	83	57,7
071	1286	79	101,5
075	187	79	14,7
093	1	124	1
097	198	150	29,7
100	4	166	6
106	328	123	40,3
113	5	152	7
117	9	168	1,5
127	1128	51	57,5
137	764	20	15,2
140	45	48	2,1
141	166	68	11,2
145	2	85	1
149	849	109	92,5
156	52	132	6,8
161	3	137	4
165	2	163	3
169	56	201	11,2
171	7454	232	1,729,3
173	1	130	1
181	17	202	3,4
185	4	237	94
190	221	276	60,9
192	377	293	110,4
194	630	305	192,1
199	16632	223	3,708,9
206	131	256	33,5
223	1	433	43
411	32	286	9,1
506	7	179	1,2
508	959	193	185,0
514	123	229	28,1
520	193	286	55,1
522	6	306	1,8
533	2257	337	760,6
536	1940	362	702,2
Total:	37,175		8,128,90

From: Gatooma (Code 137):

To Control Stations	Tons	Miles	Ton-Mile
048	51	269	13,71
052	15	249	3,73
056	29	221	6,40
058	205	207	42,43
061	47	186	8,74
063	19	165	3,13
066	74	144	10,65
070	90	103	9,27
071	9430	99	933,57
075	14	99	1,38
084	3	115	3,34
093	69	144	9,93
097	114	170	19,38
100	137	186	25,48
101	86	203	17,45
106	72	143	10,29
108	42	152	6,38
113	160	172	27,52
117	111	188	20,86
127	370	71	26,27
134	608	20	12,16
137	1	5	5
140	277	28	7,75
141	1968	48	94,46
145	30	65	1,95
149	674	89	59,98
156	38	112	4,25
165	174	143	24,88
169	314	181	56,83
171	500	212	106,00
173	17	110	1,87
176	177	132	23,36
181	130	182	23,66
185	177	217	38,40
190	292	256	74,75
194	165	285	47,02
195	834	189	157,62
199	11182	203	2,269,94
206	208	236	49,08
217	2	368	7,36
223	3	413	1,23
232	2	496	9,92
407	4	245	9,80
411	202	266	53,73
475	235	Unidentified Station	
506	22	159	3,49
508	1211	173	209,50
514	150	209	31,35
520	257	266	68,36
522	95	286	27,17
533	24	317	7,60
536	84	342	28,72
Total:	31,195		4,684,94

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From: Umniati (Code 140):

To Control Stations	Tons	Miles	Ton-Mile
048	1	297	29
071	13	127	1,65
137	2	28	5
141	3	20	6
149	45	61	2,74
199	6	175	1,05
508	2	145	29
Total:	72		6,14

From: Que Que (Code 141):

To Control Stations	Tons	Miles	Ton-Mile
048	420	317	133,14
056	36	269	9,68
058	153	255	39,01
061	1	234	23
063	3	213	63
066	231	192	53,95
070	4446	151	671,34
071	19880	147	2,922,36
084	16	163	2,60
093	9	192	1,72
097	23	218	5,01
100	274	234	64,11
101	118	251	29,61
106	149	191	28,45
113	73	220	16,06
117	2	236	47
127	312	119	37,12
134	147	68	9,99
137	1854	48	88,99
140	86	20	1,72
141	26394	5	131,97
145	26	17	44
149	6238	41	255,75
156	130	64	8,32
161	57	69	3,93
165	95	95	9,02
169	9	133	1,19
171	317	164	51,98
176	55	84	4,62
181	20	134	2,68
185	5	169	84
190	265	208	55,12
192	69	225	15,52
194	30	237	18,96
195	8568	141	1,208,08
199	18257	155	2,829,83
217	51	320	16,32
223	303	365	110,59
232	9	448	4,03
411	147	218	32,04
475	12	Unidentified station	
506	21	111	2,33
508	567	125	70,87
514	64	131	8,38
520	220	188	41,36
522	132	208	27,45
533	348	239	83,17
536	757	264	199,84
Total:	91,499		9,309,00

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From: Hunters Road (Code 145):

To Control Stations	Tons	Miles	Ton-Miles
048	1	334	334
071	77	164	12,628
127	6	136	816
137	24	65	1,560
141	47	17	799
149	271	24	6,504
156	5	47	235
165	1	78	78
169	3	106	318
171	4	137	548
190	11	191	2,101
199	2032	138	280,416
217	2	303	606
533	3	252	756
536	7	277	1,939
Total:	2,494		309,638

From Gwelo (Code 149):

To Control Station	Tons	Miles	Ton-Mil
048	1461	358	523,0
052	459	338	155,1
056	32	310	9,9
058	760	296	224,9
061	365	275	100,3
063	391	254	99,3
066	1555	233	362,3
070	142	192	27,2
071	9715	188	1,826,4
075	1	188	1
084	23	204	4,6
093	123	233	28,6
097	342	259	88,5
100	417	275	114,6
101	6	292	1,7
106	225	232	52,2
108	292	241	70,3
113	515	261	134,4
117	200	278	55,6
127	361	160	57,7
134	453	109	49,3
137	853	89	75,5
140	88	61	5,3
141	6318	41	259,0
145	236	24	5,6
149	4	5	
156	3294	23	75,7
161	342	28	9,5
165	814	54	43,8
169	3828	92	352,1
171	10227	123	1,257,0
173	59	21	1,2
176	472	43	20,2
181	499	93	46,4
185	287	128	36,7
190	53	167	8,8
192	16	184	2,9
194	21	196	4,1
195	10	100	1,0
199	8751	114	997,6
206	215	147	31,6
209		177	
217	43	279	11,9
223	71	324	23,0
232	26	407	10,5
411	13	177	2,3
475		Unidentified	Station
506	210	70	14,7
508	9558	84	802,8
514	1170	120	140,4
520	1099	177	194,5
522	374	197	73,6
533	1385	228	315,7
536	2981	253	754,1
Total:	71,160		9,567,2

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From: Selukwe (Code 156):

To Control Stations	Tons	Miles	Ton-Miles
048	1	381	381
066	3	256	768
071	182	211	38,402
093	2	256	512
101	4	315	1,260
113	1	284	284
127	3	183	549
134	5	132	660
137	34	112	3,808
141	7742	64	495,488
149	13358	23	307,234
161	13	51	663
165	3	77	231
169	32	115	3,680
171	3	146	438
176	1	66	66
194	5	219	1,095
199	523	137	71,651
508	20	107	2,140
514	14	143	2,002
533	174	251	43,674
Total:	22,123		974,980

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From: Lalapansi (Code 161):

To Control Stations	Tons	Miles	Ton-Mile
066	6	261	1,56
071	10	216	2,16
093	1	250	25
137	12	117	1,40
141	49	69	3,38
149	7196	28	201,48
156	13	51	66
165	2	26	5
169	1	64	6
171	25	95	2,37
199	21	142	2,98
Total:	7,336		216,13

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From: Umvuma (Code 165):

To Control Stations	Tons	Miles	Ton-Miles
048	8	412	3,296
063	5	287	1,435
070	44	242	10,648
071	38	242	9,196
093	72	313	22,536
097	195	329	64,155
100	45	346	15,570
108	1	315	315
117	15	214	3,210
134	115	143	16,445
140	89	95	8,455
145	81	54	4,374
149	2	77	154
156	15	26	390
165	16	38	608
169	378	69	26,082
173	2	97	194
181	1	182	182
195	639	168	107,352
206	1	231	231
506	41	138	5,658
508	1	174	174
514	3	231	693
520	14	251	3,514
Total:	1,876		304,866

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From: Chatsworth (Code 169):

To Control Stations	Tons	Miles	Ton-Mile
066	1	325	32
071	745	280	208,60
093	1	325	32
100	1	367	36
101	17	384	6,52
106	1	324	32
113	2	353	70
127	2	252	50
134	3	201	60
137	3	181	54
141	1	133	13
149	22	92	2,02
161	1	64	6
165	48	38	1,82
171	403	31	12,49
199	133	206	27,39
508	223	176	39,24
520	4	269	1,07
533	17	320	5,44
Total:	1,628		308,52

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From: Fort Victoria (Code 171):

To Control Stations	Tons	Miles	Ton-Mil
048	35	481	16,8
056	1	433	4
058	1	419	4
061	1	398	3
066	6	356	2,1
070	3	315	9
071	4199	311	1,305,8
100	22	398	8,7
101	1	415	4
106	1	355	3
113	3	384	1,1
127	3	283	8
134	4	232	9
137	143	212	30,3
141	297	164	48,7
145	1	147	1
149	2042	123	251,1
156	2	146	2
165	147	69	10,1
169	457	31	14,1
185	141	251	35,3
190	2	290	5
194	322	319	102,7
199	1537	237	364,2
217	3	402	1,2
223	5	447	2,2
411	1	300	3
508	18	207	3,7
514	1	243	2
520	12	300	3,6
522	74	320	23,6
533	6	351	2,1
Total:	9,491		2,234,50

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From: Somabula (Code 173):

To Control Stations	Tons	Miles	Ton-Mi.
071	12	209	2,508
101	3	313	939
145	6	45	270
149	76	21	1,596
165	7	55	385
176	1	22	22
185	13	107	1,391
194	1	175	175
199	587	91	53,417
506	59	49	2,891
508	4	63	252
514	4	99	396
520	1	156	156
533	1	207	207
536	8	232	1,856
Total:	783		66,400

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From: Shangani (Code 176):

To Control Stations	Tons	Miles	Ton-Mil
061	5	318	1,5
071	20	231	4,6
106	1	275	2
127	2	203	4
137	5	132	6
141	2	84	1
149	12	43	5
171	1	166	1
199	134	71	9,5
508	2	85	1
533	3	229	6
Total:	187		18,7

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From: Heavy Junction (Code 181):

To Control Stations	Tons	Miles	Ton-Miles
048	120	451	54,120
066	17	326	5,542
070	1083	285	308,655
137	50	182	9,100
149	96	93	8,928
165	2	147	294
171	31	216	6,696
176	2	50	100
185	3	35	105
190	3	74	222
194	1	103	103
199	30	21	630
223	1	231	231
522	1	248	248
Total:	1,441		394,977

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From: Bala Bala (Code 185):

To Control Stations	Tons	Miles	Ton-Mil
066	54	361	19,4
071	4	316	1,2
127	1	288	2
134	1	237	2
137	29	217	6,2
141	40	169	6,7
149	51	128	6,5
165	1	182	1
181	4	35	1
190	2	39	
194	42	68	2,8
199	16	56	8
206	3	89	2
217	5	221	1,1
232	8	349	2,7
411	3	119	3
533	1	314	3
Total:	265		49,8

From: Gwanda (Code 190):

To Control Stations	Tons	Miles	Ton-Mi
048	1	525	
058	1	463	
066	1	400	
071	21	355	7,
100	2	442	
113	1	428	
127	1	327	
137	2	256	
141	577	208	120,
149	6	167	1,
165	1	221	
171	3	290	
176	3	124	
185	27	39	1,
190	90	5	
192	4987	17	84,
194	35	29	1,
195	1	81	
199	104	95	9
217	1	260	
232	5	388	1
520	2	272	
533	1	323	
Total:	5,873		233

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From: Colleen Bawn. (Code 192):

To Control Stations	Tons	Miles	Ton-Miles
048	992	542	537,664
056	199	494	98,306
058	408	480	195,840
061	53	419	22,207
063	19	398	7,562
071	24183	372	8,996,076
093	66	417	27,522
097	24	443	10,632
100	382	459	175,338
101	876	476	416,976
106	275	416	114,400
113	237	445	105,465
117	431	461	198,691
127	34	344	11,696
134	713	293	208,909
137	2451	273	669,123
140	148	245	36,260
141	1480	225	333,000
145	98	208	20,384
149	3981	184	732,504
156	959	207	198,513
165	14	238	3,332
169	940	276	259,440
171	2703	307	829,821
176	264	141	37,224
181	264	91	24,024
185	89	56	4,984
190	1514	17	25,738
194	1161	12	13,932
195	40708	98	3,989,384
199	991	112	110,992
206	137	145	19,865
209	30	175	5,250
217	1259	277	348,743
223	2432	322	783,104
232	2269	405	918,945
407	39	154	6,006
411	759	175	132,825
506	104	212	22,048
508	11573	226	2,615,498
514	96	262	25,152
520	507	319	161,733
522	52	339	17,628
533	4837	370	1,789,690
536	9318	395	3,680,610
Total:	120,069		28,937,786

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From: West Nicholson (Code 194):

To Control Stations	Tons	Miles	Ton-Mi
048	45	554	24,
058	2	492	
066	5	429	2,
070	22	388	8,
071	461	384	177,
100	5	455	2,
113	3	457	1,
134	1	305	
137	2	285	
141	99	237	23,
149	4	196	
165	2	250	
171	8	319	2,
181	18	103	1,
185	6	68	
190	47	29	1,
192	31	12	
199	1722	124	213,
223	4	334	1,
411	1	187	
Total:	2,488		464,

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From: Cement (Code 195):

To Control Stations	Tons	Miles	Ton-Mi
048	266	458	121,
056	189	410	77,
058	546	396	216,
061	39	375	14,
063	58	354	20,
066	28	333	9,
071	11799	288	3,398,
097	76	359	27,
100	207	375	77,
101	393	392	154,
113	59	361	21,
117	203	371	75,
134	87	209	18,
137	65	189	12,
140	68	161	10,
141	1047	141	147,
149	768	100	76,
156	441	123	54,
165	627	154	96,
169	125	192	24,
171	1528	223	340,
176	539	57	30,
185	213	42	8,
190	64	81	5,
192	119	98	11,
194	76	110	8,
195	42	5	
199	620	14	8,
217	426	179	76,
223	193	224	43,
232	811	307	248,
411	75	77	5,
508	104	142	14,
514	30	178	5,
520	53	235	12,
533	494	286	141,
536	306	301	92,
Total:	22,784		5,709,

From: Bulawayo (Code 199):

To Control Stations	Tons	Miles	Ton-Mile
048	3222	472	1,520,78
052	35	452	15,82
056	111	424	47,06
058	188	410	77,08
061	7	389	2,72
063	39	368	14,35
066	158	347	54,82
070	285	306	87,21
071	13124	302	3,963,44
075	5	302	1,51
084	20	318	6,36
093	404	347	140,18
097	68	373	25,36
100	875	389	340,37
101	2411	406	978,86
106	211	346	73,00
108	33	355	11,71
113	207	375	77,62
117	93	391	36,36
127	843	274	230,98
134	205	223	45,71
137	1924	203	390,57
140	66	175	11,55
141	13783	155	2,136,36
145	456	138	62,92
149	30333	114	3,457,96
156	982	137	134,53
161	52	182	9,46
165	813	168	136,58
169	1222	206	251,73
171	8190	237	1,941,03
173	314	93	29,20
176	3457	71	245,44
181	678	21	14,23
185	2092	56	117,15
190	16949	95	1,610,15
192	3462	112	387,74
194	10442	124	1,294,80
195	76	14	1,06
199	37	10	370
206	3026	33	99,85
209	716	63	45,10
217	9958	165	1,643,07
223	11324	210	2,378,04
232	4869	293	1,426,61
407	4485	42	188,37
411	7167	63	451,52
506	624	142	88,60
508	6900	156	1,076,40
514	476	192	91,39
520	606	249	150,89
522	938	269	252,32
533	4628	300	1,388,40
536	7030	325	2,284,75
Total:	180,619		31,539,627

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From: Nyamandhlovu (Code 206):

To Control Stations	Tons	Miles	Ton-Mil
071	17	335	5,6
137	16	236	3,7
185	1	89	
199	88	33	2,9
209	9	30	2
217	11	132	1,4
223	1	177	1
232	1	260	2
Total:	144		14,6

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From: Sawmills (Code 209):

To Control Stations	Tons	Miles	Ton-Miles
171	7	300	2,100
190	2	158	316
199	2142	63	134,946
206	1	30	30
217	14	102	1,428
223	2	147	294
508	1	219	219
Total:	2,169		139,333

From: Dett (Code 217):

To Control Stations	Tons	Miles	Ton-Miles
056	3	589	1,767
071	249	467	116,283
093	3	512	1,536
100	28	554	15,512
101	1	571	571
134	6	388	2,328
137	12	368	4,416
141	141	320	45,120
149	1	279	279
171	1	402	402
195	14381	179	2,574,199
199	1053	165	173,745
206	1	132	132
209	10	102	1,020
223	376	45	16,920
232	146	128	18,688
407	1	207	207
508	1	321	321
522	50	434	21,700
536	17	490	8,330
Total:	16,481		3,003,476

From: Wankie (Code 223):

To Control Stations	Tons	Miles	Ton-Miles
048	12611	682	8,600,702
052	2151	662	1,423,962
056	3903	634	2,474,502
058	2174	620	1,347,880
061	1833	599	1,097,967
063	1814	578	1,048,492
066	5797	557	3,228,929
070	17739	516	9,153,324
071	88716	512	45,422,592
084	5769	526	3,034,494
093	7739	555	4,295,145
097	14890	581	8,651,090
100	29128	597	17,389,416
101	3012	614	1,849,368
106	10787	554	5,975,998
108	3121	563	1,757,123
113	1007	583	587,081
117	510	599	305,490
127	6988	484	3,382,192
134	8217	433	3,557,961
137	5537	413	2,286,781
140	4662	385	1,794,870
141	375724	365	137,139,260
149	47266	324	15,314,184
156	845	347	293,215
161	16	352	5,632
165	66	378	24,948
169	351	416	146,016
171	2704	447	1,208,688
176	33	303	9,999
181	41	253	10,373
185	1467	288	422,496
190	6422	327	2,099,994
192	13637	344	4,691,128
194	2760	356	982,560
195	18596	224	4,165,504
199	107600	210	22,596,000
206	2	177	354
209	302	147	44,394
217	548	45	24,660
223	85	5	425
232	13810	83	1,146,230
407	2	252	504
411	362	273	98,826
506	40	352	18,080
508	35016	366	12,815,856
514	2894	402	1,163,388
520	91	459	41,769
533	61987	510	31,613,370
536	14996	535	8,022,860
Total:	945,768		372,766,072

From: Victoria Falls (Code 232):

To Control Stations	Tons	Miles	Ton-Mi
066	1	640	
071	5	595	2,
137	11	496	5,
165	1	461	
199	160	293	46,
209	1	230	
217	1	128	
223	105	83	8,
Total:	285		65,

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From: Marula (Code 407):

To Control Stations	Tons	Miles	Ton-Mile
071	29	344	9,97
199	67	42	2,81
232	2	335	67
411	1	21	2
Total:	99		13,48

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From: Plumtree (Code 411):

To Control Stations	Tons	Miles	Ton-Mile
071	35	365	12,775
141	1	218	218
149	2	177	354
171	1	300	300
181	21	84	1,764
194	1	187	187
199	372	63	23,436
407	6	21	126
533	25	363	9,075
536	1	388	388
Total:	465		48,663

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From: Unknown station (Code 475):

To Control Stations	Tons	Miles	Ton-Miles
070	1	not known	not known
071	40		
093	9		
137	1		
141	32		
149	2		
171	1		
185	1		
190	12		
411	2		
Total:	101		

Remark:

Fortunately this small tonnage would not influence the magnitude of the total ton-mile picture.

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From: Bannockburn (Code 506):

To Control Stations	Tons	Miles	Ton-Mil
066	4	303	1,2
149	20	70	1,4
173	53	49	2,5
199	32	142	4,5
508	2	14	
514	52	50	2,6
520	6	107	6
522	8	127	1,0
533	12	158	1,8
Total:	189		15,9

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From: Shabani (Code 508):

To Control Stations	Tons	Miles	Ton-Mil
048	1	442	4
058	1	380	3
070	13	276	3,5
071	387	272	105,2
097	1	343	3
100	2	359	7
106	31	316	9,7
137	11	173	1,9
140	2	145	2
141	260	125	32,5
149	849	84	71,3
156	46	107	4,9
165	84	138	11,5
169	43	176	7,5
171	49	207	10,1
173	3	63	1
185	37	170	6,2
190	5	209	1,0
199	1736	156	270,8
217	1	321	3
223	3	366	1,0
506	10	14	1
508	3	5	
514	308	64	19,7
520	2684	121	324,7
522	156	141	21,9
533	84	172	14,4
536	19	197	3,7
Total:	6,829		925,3

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From: Ingezi (Code 514):

To Control Stations	Tons	Miles	Ton-Miles
071	32	308	9,856
100	1	396	396
145	5	144	720
149	29	120	3,480
199	122	182	22,204
506	8	50	400
508	2	64	128
520	23	57	1,311
522	1	77	77
533	4109	108	443,772
536	1	133	133
Total:	4,333		482,477

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From: Rutenga (Code 520):

To Control Stations	Tons	Miles	Ton-Mi
058	2	473	
071	13	365	4,
127	1	337	
137	5	266	1,
141	1	218	
149	2	177	
156	9	200	1,
171	2	300	
190	1	263	
199	12	249	2,
514	9	57	
522	12	20	
533	6	51	
536	2	76	
Total:	77		14,

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From: Mbizi (Code 522):

To Control Stations	Tons	Miles	Ton-Mi
071	43	385	16,
141	1	238	
149	4	197	
173	8	156	1,
185	1	263	
190	2	302	
199	366	269	98,
506	1	127	
514	4	77	
520	2	20	
522	17	5	
533	53	31	1
536	250	56	14
Total:	752		134

From: Triangle. (Code 533):

To Control Stations	Tons	Miles	Ton-Mil
048	242	587	142,0
058	113	525	59,3
066	38	461	17,5
070	57	420	23,9
071	14907	416	6,201,3
084	542	432	234,1
093	69	461	31,8
100	9	503	4,5
106	31	460	14,2
113	20	489	9,7
127	135	388	52,3
137	295	317	93,5
141	94	269	25,2
149	3287	228	749,4
156	49	251	12,2
161	32	256	8,1
165	37	282	10,4
169	266	320	85,1
171	523	351	183,5
173	17	207	3,5
176	14	229	3,2
181	59	279	16,4
185	63	314	19,7
190	63	353	22,2
192	91	370	33,6
194	112	382	42,7
199	15709	300	4,712,7
206	144	333	47,9
217	6	465	2,7
223	1	510	5
232	71	593	42,1
407	26	342	8,8
411	30	363	10,8
506	213	158	33,6
508	418	172	71,8
514	58	108	6,2
520	180	51	9,1
522	204	31	6,3
533	12	5	
536	346	25	8,6
Total:	38,583		13,062,4

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From: Chiredzi (Code 536):

To Control Stations	Tons	Miles	Ton-Mil
048	1	612	6
071	21389	441	9,432,5
097	219	512	112,1
108	20	494	9,8
137	108	342	36,9
141	8	294	2,3
145	59	277	16,3
149	1523	253	385,3
156	2	276	5
169	1	355	3
171	16	376	6,0
173	60	232	13,9
176	45	254	11,4
181	13	304	3,9
199	19644	325	6,384,3
407	13	367	4,7
514	2	133	2
520	2	76	1
522	1	56	
533	30	25	7
536	183	5	9
Total:	43,339		16,423,5

Table showing total tonnages and ton-mile goods transported
from indicated control stations:
 (Summary of tables on pages A100 to A154).

From Control Station Code	Tons	Ton-Mile
048	307,843	32,769,858
052	1,233	92,909
056	22,314	2,562,043
058	14,323	2,002,424
061	3,513	321,261
063	3,809	409,333
066	8,514	760,386
070	176,624	21,291,162
071	297,221	41,131,569
075	77	9,029
084	29,048	4,954,266
093	18,305	3,802,320
097	22,602	5,436,217
100	23,040	4,438,385
101	39,716	12,091,916
106	35,101	8,074,136
108	92,432	10,611,702
113	30,305	7,415,954
117	16,857	2,990,563
127	12,232	2,219,585
134	37,175	8,128,904
137	31,195	4,684,927
140	72	6,149
141	91,499	9,309,006
145	2,494	309,638
149	71,160	9,567,252
156	22,123	974,986
161	7,336	216,135
165	1,875	304,867
169	1,628	308,525
171	9,491	2,234,503
173	783	66,461
176	187	18,772
181	1,441	394,974
185	265	49,851
190	5,873	233,800
192	120,069	28,937,786
194	2,488	464,487

Table continued on next page:

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Table continued from previous page:-

From Control Station Code	Tons	Ton-Mi.
195	22,784	5,709,04
199	180,619	31,539,68
206	144	14,68
209	2,169	139,38
217	16,481	3,003,48
223	945,769	372,766,08
232	285	65,48
407	99	13,48
411	465	48,68
475	101	-
506	189	15,98
508	6,829	925,38
514	4,333	482,48
520	77	14,88
522	752	134,48
533	38,583	13,062,48
536	43,339	16,423,58
Total:	2,825,281	723,954,88

Average miles per ton = 256.2

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ANNEXURE 11

Short distance movements by rail.

RHODESIA RAILWAYS INTERNAL GOODS TRANSPORTATION FROM CONTROL STATIONS OVER DISTANCES LESS 100 MILES:

Control Station Code	Tons Moved Less Than 100 Miles	Ton-Miles
048	14,193	458,757
052	881	18,756
056	1,995	93,746
058	2,953	152,762
061	3,250	270,246
063	1,345	83,556
066	5,575	266,151
070	107,840	2,987,719
071	149,966	9,501,261
075	47	1,950
084	10,818	437,788
093	2,805	126,278
097	8,428	562,131
100	10,943	772,329
101	471	12,501
106	9,637	438,110
108	62,046	4,866,455
113	11,398	824,136
117	10,155	878,111
127	1,958	139,686
134	4,274	260,579
137	13,372	1,137,547
140	50	2,861
141	35,086	488,878
145	348	9,176
149	16,807	895,419
156	21,117	803,682
161	7,286	204,642
165	583	40,257
169	474	16,405
171	604	24,310
173	744	59,229
176	151	10,368
181	134	9,985
185	67	4,237
190	5,244	97,258
192	43,736	4,058,062
194	84	2,143
195	1,672	71,180
199	38,997	2,802,485
206	98	3,263
209	2,143	134,976
217	376	16,920
223	14,443	1,171,315
232	105	8,715
407	68	2,835
411	399	25,326
506	127	6,625
508	1,173	91,372
514	34	1,916
520	35	1,311
522	326	16,136
533	742	24,214
536	216	1,873
	<u>627,819</u>	<u>35,397,929</u>

Average distance per ton = 56.38 miles.

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ANNEXURE 12

Vehicles other than Public
Service Vehicles.

VEHICLES OTHER THAN PUBLIC SERVICE VEHICLES:

Vehicle population:

An analysis was also made of registered vehicles other than public service vehicles which could be engaged in goods transportation.¹⁾ These vehicles are listed below:-

Vehicle Description	Conservative Estimate of Average Capacity	No. of Vehicles	Total Carrying Capacity
Light Commercial	1 ton	20,109	20,109
Heavy Commercial Petrol	5 tons	2,317	11,585
Heavy Commercial Diesel	5 tons	3,732	18,660
Total No. of goods vehicles:		26,158	50,354

(Note: The estimated carrying capacity of 2,230 public service vehicles is only 20,007 tons).

These vehicles are permitted to travel anywhere in Rhodesia as long as they only carry goods on own account.

- 1) Analysis of registered motor vehicles in classes in local and road council areas - 1965 - Compiled by Treasury. (This analysis does not include farm/mining vehicles which are used on the properties of their owners.

After the possibilities of a questionnaire to commerce and industry and a sample survey of traffic on main roads were discussed with the Director of the Central Statistical Office, it was decided that no attempt would be made of trying to establish to what extent these vehicles in fact carried goods over long distance

Both these possibilities were disregarded as their cost would have been too high and it was seriously doubted whether satisfactory results would be obtained.

The basic assumption that these vehicles could be used for long distance transportation, however, seems justified. The only question which remains is whether restriction on their long distance transportation could be justified in terms of transportation costs.

Transportation costs:

Since no attempt was made of establishing the transportation costs of these vehicles, these costs will have to be considered in terms of logical arguments.

It seems reasonable to assume that the transportation costs of these vehicles would be higher than those of public service vehicles for the following reasons:-

/a.

- a. Since the transportation of goods is not the primary objective of the owners of these vehicles but subsidiary to their main business be it production, mining or trade, it can be safely assumed that the utilization of the carrying capacities of the vehicles would be very much lower than that of Public Service Hauliers. Cost per ton-mile should, therefore, be greater than that of Public Service Hauliers.
- b. The bulk of these vehicles are classified as light commercial vehicles and have a smaller carrying capacity than public service vehicle. This should also result in higher transportation costs per ton-mile.

In costing these vehicles the direct cost of transportation is generally included in the overhead costs and an attempt is usually made to recover the transportation costs. It could be assumed that direct costs of transportation are in fact recovered, and that the owners operate on marginal costing principles only. No provision has to be made for capital recovery except with regards to the contribution from the main direction (selling etc.) of the owners.

Public Service Hauliers quite rightly claim that they cannot compete with private hauliers on a "cost basis. The reason for this is not that transportation costs of the private hauliers are actually lower but rather that the costing methods and ideas employed by these hauliers do not generally reflect true costs of their transportation operations.