

**"TON-MILE  
COST"**

Published @ 2017 Trieste Publishing Pty Ltd

ISBN 9780649259786

"Ton-mile Cost" by Thomas F. Woodlock

Except for use in any review, the reproduction or utilisation of this work in whole or in part in any form by any electronic, mechanical or other means, now known or hereafter invented, including xerography, photocopying and recording, or in any information storage or retrieval system, is forbidden without the permission of the publisher, Trieste Publishing Pty Ltd, PO Box 1576 Collingwood, Victoria 3066 Australia.

All rights reserved.

Edited by Trieste Publishing Pty Ltd.  
Cover @ 2017

This book is sold subject to the condition that it shall not, by way of trade or otherwise, be lent, re-sold, hired out, or otherwise circulated without the publisher's prior consent in any form or binding or cover other than that in which it is published and without a similar condition including this condition being imposed on the subsequent purchaser.

[www.triestepublishing.com](http://www.triestepublishing.com)

**THOMAS F. WOODLOCK**

**"TON-MILE  
COST"**



# “TON-MILE COST”

BY

THOMAS F. WOODLOCK.

SECOND EDITION.



REPRINTED FROM THE

WALL STREET JOURNAL

AND PUBLISHED BY

DOW, JONES & CO.,

42-44 BROAD STREET,

NEW YORK.

---

1899.

44

Copyrighted by  
THOMAS F. WOODLOCK.

---

1899.

## INTRODUCTORY.

In the short series of chapters which is here begun, an attempt will be made to set down and illustrate some of the main principles governing the transportation of freight by railroads in the United States. The primary object is to convey a clear idea of what is meant by the "Ton-mile," the "Train-mile," the "Unit of service," the "Unit of product," and the various other words and phrases commonly used to designate the main facts and things in the Railroad industry. The secondary object is to indicate the relations of these things to one another with the view of outlining the principal factors governing the economy of the industry.

The matters to be discussed constitute what is really the most important branch of the analysis of general railroad results, for they deal in the main with questions of cost, which necessarily determine net earnings and profits. In quite another sense, however, these matters may prove of interest to practical railroad men, for they are, in a measure, the theory of their practice. Experience shows that comparatively few practical men know very much about the theory of their industry, consequently it may profit to deal with it in a purely theoretic way, touching only very superficially upon matters of practice.

To those whose business it is to canvass, weigh and examine railroad results, a fairly clear perception of first principles is almost essential, for the evidence upon which judgments have to be made is of such a nature as to be thoroughly intelligible only by the light of these principles. Railroad analysis is, after all, little more than a series of comparisons, but the possibilities of error and fallacy in the process of comparisons are multitudinous unless the way is guarded by a general knowledge of the basis upon which comparisons can alone be correctly made. An attempt is made to indicate this basis in a general way.

No originality is claimed for the form of the inquiry or the scheme upon which it is founded. The late Mr. Albert Fink, as far back as 1873, laid the lines upon which practically all scientific railroad thought has since proceeded. We have followed these lines as closely as may be. Those who are curious to see how closely, are referred to the annual report of Louisville & Nashville for the year 1873-74.





## CHAPTER I.—THE UNIT OF TRANSPORTATION.

Transportation is the act of conveying something or some one over a certain distance. It is a combination of quantity and distance, and is therefore an abstraction which we may denote by the mathematical phrase:

$$\text{TRANSPORTATION} = \text{QUANTITY} \times \text{DISTANCE.}$$

Using the customary units of quantity and distance we have the units of the two kinds of transportation, thus:

$$\begin{aligned}\text{PASSENGER TRANSPORTATION} &= \text{PASSENGER} \times \text{MILE.} \\ \text{FREIGHT TRANSPORTATION} &= \text{TON} \times \text{MILE.}\end{aligned}$$

Or, as we may for convenience denote them, "passenger-miles" and "ton-miles." These are the units of transportation, and no other units are possible, unless multiples of passengers or tons, or multiples of miles.

The passenger-mile is an abstraction, because it does not exist except as an arbitrary mental concept. The same is true of the ton-mile. Yet both are real and true measures of transportation, whereas neither of the component parts is alone a measure.

Transportation is sold to the public practically in these units, although they are stated in a slightly different way, at least as far as freight is concerned. There may be laid down as general principles that—

*The price of passenger transportation per passenger varies directly with the distance traveled, leaving urban, suburban and interurban traffic out of consideration; and that—*

*The price of freight transportation per article varies largely according (1) to the character of freight; (2) to the quantity offered at a given time for transportation; and, these things being equal, (3) it varies with the distance to which freight is transported.*

Consequently the average passenger-mile revenue tends to constancy on a given road over a given time, and should not vary greatly on two given roads in similar localities. In other words, the factors composing it tend to constancy.

The average ton-mile revenue, however, may vary exceedingly, and does so vary, not merely upon one road as compared with another, but upon one road as compared with itself in previous years. For instance, the first factor which determines it is capable of

almost infinite variety. The different kinds of freight offered for transportation are almost innumerable, and each kind has practically a rate of its own, at some time or another. Efforts are constantly being made to classify freight so as to reduce the number of different rates and simplify the making of rates. A uniform classification has been found impossible for various reasons. It may be said, however, that in fixing rates the first step is to consider the character of the freight, and charge it partly according to its value, but, in the main, to charge the traffic with what it will fairly bear.

The three main factors in the making of a rate are probably :

1. Consideration of general *cost* of service involved.
2. Consideration of competitive requirements.
3. General consideration of *value* of service rendered, with reference to value of freight, etc.

The first factor involves bulk of freight, terminal questions, handling en route, etc. While, for reasons that will be apparent later, it is almost impossible to determine in advance the cost of hauling given freight, it is possible to determine greater cost in some cases than in others.

The second factor may often be of extreme importance, as, for example, in the matter of rates on export grain, etc., and it probably cuts a larger figure in the making and changing of rates from time to time than does any other factor.

The third factor applies in a general way to all rates originally, and is probably, in theory, the principal factor, by reason of the impossibility of establishing in advance scientifically accurate measures of cost per ton or per ton-mile.

Consequently, without going at length into the question of how transportation prices are originally fixed, it is necessary to note that these prices may be the product of several factors originally, one factor being perhaps predominant at one time, and another at another time, generally more than one factor being operative.

It is right, for example, to charge specie a much higher rate than coal, although in practice specie is more convenient and economical to handle. A car-load of specie may pay more for transportation than a train-load of coal, and fairly so. A train-load of high-class furniture will pay more than a train-load of iron castings or machinery for the same reason. Again, business involving large terminal expenses will pay more than business not involving such expense.

Then, practically all tariffs provide a higher rate for freight

offered in "less than car-load lots" (L. C. L.) than for the same freight in "car-load lots" (C. L.) for obvious reasons. Anything tending to decrease the number of large shipments and increase the number of small shipments of the same class of freight will tend to increase the average ton-mile revenue from such freight, although there may be no change in the number of ton-miles.

Again, it has been said that character and quantity of freight being equal, the price of transportation per article varies more or less as the distance to which it is carried. This, while true in a general sense, is not true in a mathematical sense. For example, according to the Illinois schedule of maximum freight rates, we find the following maximum charge prescribed for the carriage of wheat (in cents per 100 pounds):

25 miles .....	5.43 cents
50 miles .....	6.76 cents
100 miles .....	8.91 cents
200 miles .....	11.58 cents
500 miles .....	15.59 cents

From this it appears that while more is charged for the carriage of wheat for long distances than for short distances, the additional cost by no means represents or coincides with the additional mileage in a mathematical way. All that can be said is that the longer the haul the greater the cost per ton. The law governing Interstate Commerce prevents a greater charge being made for a longer than for shorter haul. The greater the distance, however, the smaller will be the ton-mile revenue. In the above table, for example, the ton-mile revenue (1 ton, 2,000 pounds) on wheat carried 50 miles is 2.7 cents; on wheat carried 100 miles it is 1.78 cents; on wheat carried 200 miles it is 1.15 cents, and on wheat carried 500 miles it is 0.62 cents.

Consequently, other things being equal, ton-mile revenue will vary inversely to the length of haul. A road carrying 1,000,000,000 ton-miles and carrying 5,000,000 tons an average of 200 miles each, will show a lower ton-mile revenue than a road carrying the same number of ton-miles, but transporting 8,000,000 tons an average distance of 125 miles each, supposing the character of tonnage to be exactly the same in both cases. This, as will be seen later, is fair, as the cost of handling the smaller tonnage with long haul is less than that of handling the larger tonnage with shorter haul.