

# **TRUCKLOAD TRANSPORTATION: ECONOMICS, PRICING & ANALYSIS**

## *Chapter 1 Preview Version*

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# TRUCKLOAD TRANSPORTATION: ECONOMICS, PRICING & ANALYSIS

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**This preview document includes only Chapter 1.**

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## How To Use This Book

Truckload transportation pricing is a complex topic with many variables and considerations. This book is organized so that a novice can learn the basics of truckload transportation then move into the more advanced concepts involved with one-way pricing, dedicated pricing, and bid response analysis. However, it is highly recommended that even experienced readers start from the beginning of the book. A sound understanding and review of the basic principles of truckload transportation provides the necessary foundation for fully comprehending the more advanced concepts that are presented later in the book.

While the book is written primarily for the benefit of truckload carriers, shippers and related parties will also gain valuable insight into truckload transportation by reading the entire book. While Chapter 15 focuses specifically on shipper issues, it is important that shippers read the entire book to get the maximum benefit from this chapter. The topics covered throughout the book will provide shippers with a much deeper understanding of the truckload carrier's business model, cost structure, and operating strategy. By having a greater understanding of the needs of their carriers, shippers can become better partners and potentially enjoy improved service and lower transportation costs as a result.

Throughout this book, readers will see operating cost information and specific rates and prices. While most costs and rates are historically accurate for the time this book was written, this information is shown for illustration purposes only. Truckload rates and operating costs change over time based on market conditions, fuel prices, driver wage expectations, equipment costs, and many other factors. Unless otherwise indicated, consider all cost and price figures shown in this book as only examples and not specific facts or pricing recommendations.

In some circumstances, there will be real-world exceptions to the general concepts in this book. However, a thorough understanding of the concepts presented in this book will provide the ability to identify and interpret any exceptions to the general rule. While this book cannot possibly address every unique situation a carrier or shipper will face, it does provide a solid foundation of general theory and specific analytical techniques to properly approach almost any pricing and analysis challenge.

### **Technical Tips**

The book includes a number of "Technical Tips" that provide detailed explanations of the application of spreadsheet and database software to several of the analysis examples presented in the book. The tips provide no new information about a particular topic other than the programming details around the solution. Unless the reader has a specific interest in the technical details of a particular topic, these "Technical Tips" can safely be disregarded.

### **On-line Resources**

Certain lengthy technical tips are not covered in complete detail within the book but are available for download online at no cost. Please visit [www.TruckloadTransportation.com](http://www.TruckloadTransportation.com) to access these expanded technical tips. In addition, the full spreadsheet models for many of the analysis and pricing techniques presented in this book are available for purchase at the website, including the full dedicated fleet pricing model.

## **About the Author**

Leo Lazarus has over 15 years of experience as a financial analyst, pricing analyst, transportation consultant, and adjunct professor of business. As a part-time college instructor, Leo taught courses including Corporate Finance, Management Accounting, Economics, Business Statistics, Management, Marketing, and Operations Management.

In the truckload transportation field, Leo worked for Memphis-based M.S. Carriers from 1995 to 2002, primarily as a senior pricing analyst for both dedicated and one-way truckload transportation. While at M.S. Carriers, Leo was highly involved with the most sophisticated and complex distribution networks for many of the nation's largest shippers. Since 2002, Leo has been an independent consultant in the truckload transportation field, serving the analysis, pricing and training needs of several Fortune 500 shippers and carriers of all sizes.

Leo has an M.B.A. from The University of Mississippi and a B.B.A. in Management, also from The University of Mississippi.

## CHAPTER 1: Introduction to Truckload Transportation

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### Introduction

On the surface, full-truckload transportation appears to be a fairly simple business. For a predetermined charge, a truck picks up a full truckload for a customer at Point A and delivers the load to Point B. Next, the truck picks up a load for a different customer at Point C and delivers the load to Point D. Basically, this cycle continues constantly for every truck and every driver in a carrier's network. As this cycle continues, well-managed trucking companies have many challenges. In the short run, carrier management must answer such questions as:

1. How much should we charge customers moving loads from Point A to Point B?
2. How much should we charge customers moving loads from Point B to Point A?
3. Is the company making a profit while moving loads between Points A and B?
4. Are some customers and some loads more profitable than others? If so, why?
5. Should some customers be charged more than others for the same trip?
6. Should we increase rates with certain customers to improve profitability? Should we decrease rates with certain customers to attract additional business?
7. Within our network, should we increase business with certain customers? Should we decrease or eliminate business with certain customers?

In the long run, the carrier's management team must determine profitable growth strategies for the company. Strategic considerations for the carrier include:

1. What services should be offered to our customers?
2. Should our services be expanded into new types of truckload transportation?
3. Should our current services be expanded into new geographic areas?
4. Should our fleet of tractors and trailers be expanded? Should we expand with new types of equipment or new services?
5. How will the charges and prices for these new services be determined? How will profits be measured for these new services?

The overall goal of this book is to provide trucking managers with the tools and techniques to successfully answer these and other tactical and strategic questions. The book provides a general overview of trucking companies, including the organizational structure, cost structure, and basic profitability strategies ideal for anyone wishing to better understand the truckload transportation industry. In addition, the book provides an excellent resource that will allow shippers to better understand how their expectations, requirements, and restrictions impact the costs, profitability, and revenue needs of their carriers. By having a greater understanding of the needs of their carriers, shippers can become better partners and potentially enjoy improved service and lower transportation costs as a result.

In some circumstances, there will be real-world exceptions to the general concepts in this book. However, a thorough understanding of the concepts in this book will provide the ability to identify and interpret any exceptions to the general rule. While this book cannot possibly address every unique situation a carrier or shipper will face, it does provide a solid foundation of general theory and specific analytical techniques to properly approach almost any pricing and analysis challenge.

Truckload pricing, especially on a one-way basis, is as much of an art as it is a science. For example, if several experienced pricing managers from different carriers were asked to provide a truckload rate per mile from Columbus, OH to Dallas, TX, the rates provided by those experts would likely vary significantly. However, the internal and external factors that are considered by those pricing managers to determine the rate per mile are the same. This book provides a detailed explanation of these factors and how the factors interact to influence the pricing decision. After learning these basic concepts, readers will understand why the rate per mile in the Columbus to Dallas example could vary noticeably among different carriers.

Throughout this book, readers will see operating cost information and specific rates and prices. While most costs and rates are historically accurate for the time this book was written, this information is shown for illustration purposes only. Truckload rates and operating costs change over time based on market conditions, fuel prices, driver wage expectations, equipment costs, and many other factors. Unless otherwise indicated, consider all cost and price figures shown in this book as only examples and not specific facts or pricing recommendations.

## The Trucking Business Cycle

The core business model of a trucking company is similar to most common businesses. Each truck serves as a moving “factory” and the miles driven by the truck represent the product that is produced by the factory. The table below compares the trucking business model to the models of General Motors and McDonald’s.

**Business Model Comparison**

<b>Company</b>	<b>Facility</b>	<b>Unit of Output</b>
General Motors	Plant	Cars
McDonald’s	Restaurant	Hamburgers
Truckload Carrier	Truck	Miles

Trucking companies produce miles in much the same way that General Motors produces cars or McDonald’s produces hamburgers. Keep this relationship in mind throughout the discussion of fixed and variable costs and the various economic models that follow.

Each truck moves continuously throughout the carrier’s network in a semi-random pattern from load to load and customer to customer. The timeline in the table below illustrates the work flows for a truck and driver over a three day period.

**Three Day Driver Work Cycle**

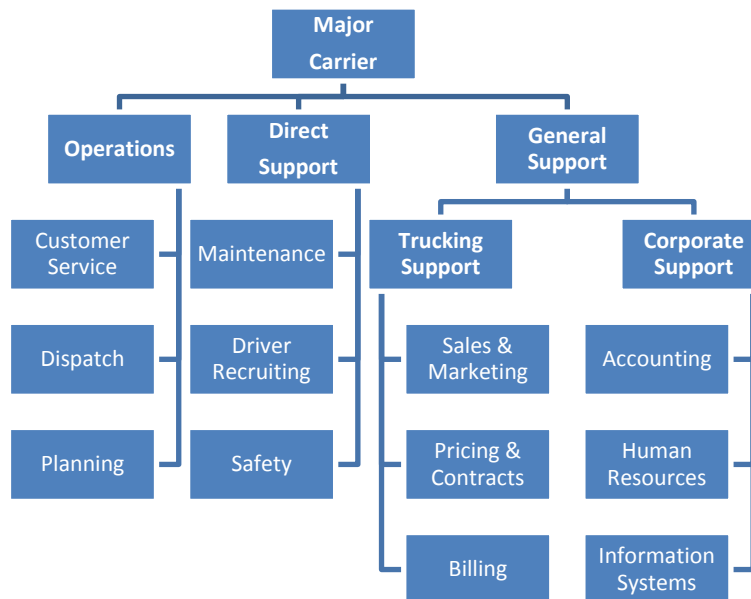
<b>Day and Time</b>	<b>Activity / Event</b>
Sunday 5:00 pm	<b>Home awaiting dispatch.</b> The driver is at home in West Memphis, AR waiting to receive his next load assignment from his dispatcher. At 5 pm, the driver receives his dispatch. He must pick up his next load at ABC Express in Memphis, TN at 7 am on Monday. He must deliver the load to Houston, TX by 2 pm on Tuesday.
Monday 6:45 am	<b>Arrival at Origin for Pick-up.</b> The driver arrives at ABC Express in Memphis. After hooking to the pre-loaded trailer and receiving the paperwork for the load, the driver is ready to depart for Houston, TX.
Monday 7:22 am	<b>Departure from Origin.</b> The driver departs ABC Express in Memphis, TN and begins the 650 mile trip to Houston, TX.
Monday 6:05 pm	<b>Rest Break.</b> After approximately 11 hours of driving, the driver stops at a truck stop about 120 miles from Houston, TX to take a legally required rest break for 10 hours.
Tuesday 5:10 am	<b>Drive to Destination.</b> After the mandatory rest break required by U.S. Department of Transportation safety regulations, the driver continues on the final portion of the trip to Houston, TX.
Tuesday 7:14 am	<b>Final Delivery.</b> The driver arrives at the destination in Houston, TX. After dropping the trailer and completing the paperwork, the driver is ready for his next load.
Tuesday 7:53 am	<b>Meal and fuel awaiting dispatch.</b> The driver goes to a nearby truck stop to eat breakfast, fill the truck with fuel, and wait for his headquarters to assign him to a new load.
Tuesday 8:55 am	<b>Dispatch.</b> The driver receives his next load assignment from his dispatcher. He must drive 22 empty miles to Sugar Land, TX to pick up his next load going to Dallas, TX.
Tuesday 10:15 am	<b>Load Pick-up.</b> The driver arrives in Sugar Land, TX for his next load. After receiving the paperwork for the load, the driver is ready to depart on the 260 mile trip to Dallas, TX.
Tuesday 3:37 pm	<b>Load Delivery.</b> The driver arrives at the destination in Dallas, TX. After dropping the trailer and completing the paperwork, the driver is ready for his next load.
Tuesday 4:45 pm	<b>Awaiting Dispatch.</b> After delivering his load, the driver goes to his carrier's terminal and maintenance facility in nearby Garland, TX. While at the terminal, the driver takes a required rest break and again waits for his dispatcher to assign him to his next load.

Truck drivers operate in a cycle very similar to the above example at all times. Since most drivers are paid by the mile, time management is critical to the driver’s income. In most cases, drivers prefer to be assigned to a new load as soon as possible after completing the previous load. The carrier’s revenues are also usually earned on a mileage basis, so time management and driver productivity is critically important to the carrier’s goals as well.

The driver work cycle shown above is typical of most over-the-road carriers. Carriers and drivers must work together to maximize the efficiency of the work cycle and the carrier’s customer network. This book will discuss and analyze each of the primary operating variables and how those variables affect the carrier’s productivity and profitability. The book will also discuss how each operating variable impacts the carrier’s pricing, rate structure, and operating strategy.

## The Organizational Structure of a Truckload Carrier

The core organizational structure of a trucking company includes two major groups, operations management and general support staff. The operations group recruits, hires, and manages the truck drivers, communicates with customers, and maintains the fleet of trucks and trailers. The support group includes key areas such as sales, marketing, human resources, and accounting. The organizational chart below reflects the primary departments within most trucking companies. With smaller carriers, a single individual may perform several of the roles described below.



### Operations

#### Customer Service

Customer service representatives serve as the primary day-to-day contact for customers. Customer service representatives are usually assigned responsibility for the customers in a specific geographic area or a specialized group of related customers. Customer service representatives are responsible for determining which customer loads are accepted and which loads are declined. Through internal and external communication, the customer service group must balance the needs of the customer with the needs of the trucking company and its drivers.

Customer service representatives receive the critical load information from the customer. The basic load information includes the origin and destination, the pick-up and delivery dates and times, and trailer numbers. The pick-up and delivery dates and times may be negotiated to fit the needs of the carrier without disrupting the delivery needs of the customer. The customer service representative will also contact the customer if any problems occur with a load, especially issues that will cause the load to be delivered late, such as weather, accidents, traffic delays, or driver errors.

Customer service representatives also manage the trailers at each customer location. The customer service group makes sure that customers have an adequate number of trailers at each location while also making sure that customers unload trailers in a timely fashion.

### **Dispatch**

Dispatchers serve as the manager and primary contact person for a group of truck drivers. Dispatchers are in constant contact with their drivers to make sure that both the driver's needs and the company's needs are being met. The driver's needs include securing adequate miles (income), maintaining log books, and honoring the driver's need to get home on a regular basis. Dispatchers also focus closely on company objectives including safety, on-time delivery, and driver productivity.

### **Planning**

Planners are responsible for assigning available trucks to available customer loads. The goals of the planner in creating load assignments include insuring on-time delivery, minimizing empty miles between loads, and meeting driver needs. Planners may be assigned to a specific fleet of trucks or all available trucks within a specific geographic region. Many trucking companies utilize computer-based optimization technology that assists the planner with recommendations on the complex decision of which trucks to assign to which loads.<sup>1</sup>

## ***Direct Support Departments***

### **Maintenance**

The maintenance department is responsible for the repair and routine preventative maintenance of the company's tractors and trailers. The maintenance department may also provide input into what types of equipment the company will purchase. Large trucking companies will often have company-owned maintenance facilities in multiple locations throughout their service area. Smaller trucking companies may have one central maintenance facility and subcontract a portion of maintenance activities to equipment dealerships and other third party maintenance providers. The computer systems of many carriers will track activity for all equipment and provide alerts to the carrier when equipment is due for routine maintenance.

### **Driver Recruiting**

The driver recruiting department is responsible for attracting and hiring the team of truck drivers for the carrier. Because driving a truck is a difficult and stressful career, driver turnover is a very serious problem for all trucking companies. Many trucking companies experience driver turnover rates in excess of 100% per year and, as a result, carriers must constantly recruit, hire and train new drivers. Since the company will not be able to satisfy customer needs without drivers, the role of the driver recruiter is critical to the success of trucking companies.

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<sup>1</sup> A future chapter provides a more detailed discussion of network management and network optimization software programs.



Common activities performed by the driver recruiting department include developing and placing advertisements for drivers, carefully screening and interviewing new applicants, and measuring driver turnover and related items such as the causes of driver turnover. The driver recruiting department can help with the driver turnover problem by establishing employment policies and hiring practices to hire only the best candidates for driver job openings.

## **Safety**

The carrier's safety department is responsible for the management of the company's safety programs and initiatives. The safety performance of all carriers is constantly monitored by the United States Department of Transportation (D.O.T.) to ensure the safety of all vehicles on the nation's highways and interstates. The carrier's safety department must be certain that the company is in compliance with all D.O.T. regulations. The safety department organizes and performs many critical activities including training drivers, investigating accidents, and reviewing driver logs and hours-of-service compliance.<sup>2</sup>

The safety department or an insurance-related operations group will oversee the management of shipment issues related to over, short, or damaged shipments and freight claims by shippers.<sup>3</sup> Shipper issues will commonly arise as a result of accidents, improper loading, inaccurate paperwork, or even driver theft. The department will investigate each incident and provide the appropriate compensation to shippers in cases where the loss was caused by the carrier.

## ***Trucking Support Departments***

### **Sales and Marketing**

While the customer service team provides the day-to-day contact with the shipper, the sales department is the primary strategic contact between the shipper and carrier. The sales department will negotiate pricing with the shipper and provide the shipper's transportation management team with information on available capacity and the markets the carrier would like to serve for the shipper. The sales department provides the link between the shipper and the carrier's customer service and operations team. The sales department must constantly be certain that the carrier is meeting the shipper's expectations for capacity and service. If the customer fails to meet commitments made to the carrier, the salesman will contact the customer to address any outstanding issues.

Trucking companies of all size have a sales department. In a small carrier, the owner or president is often the primary salesperson. Most large carriers employ national sales forces with sales representatives strategically located across the country in every major market that the carrier serves. Large carriers may also have specialized national account sales managers that serve major shippers in large industries such as retail distribution or automobile

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<sup>2</sup> The D.O.T. has very strict regulations governing the amount of time a driver can spend behind the wheel driving each day and each week. These regulations and their impact on carriers will be discussed in detail throughout this book.

<sup>3</sup> Over, short, and damaged is commonly referred to as O S & D.

production. The national account managers work closely with regional sales managers to meet needs and address problems.

### **Pricing and Contracts**

The pricing department is responsible for setting company pricing and managing contracts with customers. The pricing department will work closely with the sales group during the process of setting prices, negotiating contracts, and identifying desirable business opportunities. The pricing department may also perform various types of profitability studies to identify pricing deficiencies and evaluate the profitability of individual customers and geographic markets.

Carriers must maintain accurate and up-to-date files on customer contracts and rate agreements. Large carriers will often have an extensive department to manage pricing and contracts. In smaller carriers, a salesman or administrative person might also perform the majority of the duties for the pricing and contracts function.

### **Billing and Revenue Management**

The revenue management department is responsible for the billing and collection of the company's revenues based on rates and contracts provided by the pricing department. The department prepares and submits invoices to customers and makes collection calls to customers that fail to pay invoices in a timely manner. This group may also provide the shipper with important paperwork such as signed bills of lading and other important shipment documentation. The carrier maintains these documents in order to provide "proof of delivery" when required.

## **Carrier Measurements and Key Performance Indicators**

This section provides a brief introduction to several major definitions and measurements that are critical to all truckload carriers. Each item is a key component of the truckload business model. The relationships between the measures and their impact on pricing and profitability will be explained in detail throughout this book.

### ***Mileage Measurements***

In much the same way as a manufacturer produces a product, truckload carriers produce miles. A large portion of a carrier's costs are incurred as miles are driven by the carrier's trucks. Also, most loads are charged to the customer on a rate-per-mile basis. As a result, carriers must measure and manage miles closely to control costs and maintain a profitable network. The key mileage types are described below.

### **Billed Miles**

Billed miles are the standardized miles that appear on the customer's invoice for trucking services. Billed miles represent a predefined standard number of miles between Point A and Point B, not necessarily the actual miles driven by the carrier to deliver the load. The standard miles are commonly determined through a published third-party source such as

Rand-McNally or PC-Miler.<sup>4</sup> Since mileages vary slightly based on the particular reference source, the carrier and the shipper will agree upon a predetermined third-party mileage source as a standard part of the contract.

### Loaded Miles

All miles driven when the truck is loaded with customer freight are considered loaded miles. Loaded miles may occasionally differ slightly from billed miles when the driver takes a different route while moving a load from Point A to Point B. For example, a truck moving a customer load with 600 billed miles may be routed through a carrier terminal for preventive maintenance and incur 25 out-of-route loaded miles. In this case, the load would include 600 billed miles and 625 loaded miles.

### Empty Miles

Empty miles occur when a truck is not loaded with any freight and the carrier receives no compensation from a customer. Empty miles are usually incurred either when positioning a truck from one customer location to another or returning the truck to a terminal. Minimizing empty miles is a critical element of overall profitability and network efficiency for the carrier.<sup>5</sup>

### Total Miles

All miles driven by the truck are included in total miles. Total miles include all loaded miles and all empty miles. Total miles drive all variable costs for the carrier. For every mile driven, the carrier will incur variable operating costs such as fuel, maintenance and driver compensation. The load-level detail report below shows each of the different mileage types for six truckloads.

Load Detail Report						
Load Number	Billed Miles	Loaded Miles	Empty Miles	Total Miles	Empty Percent	OOR Miles
59841	752	752	82	834	9.8%	0
59842	611	611	45	656	6.9%	0
59843	452	477	70	547	12.8%	25
59844	1,021	1,056	106	1,162	9.1%	35
59845	547	547	130	677	19.2%	0
59846	865	865	93	958	9.7%	0
Totals:	4,248	4,308	526	4,834	10.9%	60
<i>6 total loads</i>						
Averages:	708	718	88	806	10.9%	10

<sup>4</sup> Rand-McNally and PC Miler are third-party companies that provide software products and databases that contain the mileage information for any point-to-point combination.

<sup>5</sup> Empty miles also occur when the tractor moves from point to point without a trailer. A tractor operating without a trailer is often referred to as “bobtailing” in industry jargon.

## Out-of-Route (OOR) Miles

Out-of-route miles are loaded miles driven beyond the practical, standard route from Point A to Point B. For example, a truck might drive out of route so that a driver may visit his home or a terminal location for maintenance or fuel. Out-of-route miles are a necessary part of normal operations but are generally only a minor concern for most carriers. However, measures should be taken to minimize out-of-route miles as much as possible to avoid unnecessary variable costs.

## Revenue Types and Measurements

Gross revenue levels and revenue per mile are critical operating measures for all carriers. This section describes the different types of carrier revenues and the key per-mile revenue measurements. The load detail report below includes the miles and revenues for six truckloads. Refer back to this table as the various revenue types are discussed in the sections that follow.

**Load Detail Report**

Load Number	Billed Miles	Loaded Miles	Empty Miles	Total Miles	Empty Percent	Billed Rate Per Mile	Linehaul Revenue	Revenue Per Mile	
								Loaded	Net
59841	752	752	82	834	9.8%	\$ 1.62	\$ 1,218.24	\$ 1.62	\$ 1.46
59842	611	611	45	656	6.9%	\$ 1.44	\$ 879.84	\$ 1.44	\$ 1.34
59843	452	477	70	547	12.8%	\$ 1.90	\$ 858.80	\$ 1.80	\$ 1.57
59844	1,021	1,056	106	1,162	9.1%	\$ 1.33	\$ 1,357.93	\$ 1.29	\$ 1.17
59845	547	547	130	677	19.2%	\$ 1.71	\$ 935.37	\$ 1.71	\$ 1.38
59846	865	865	93	958	9.7%	\$ 1.55	\$ 1,340.75	\$ 1.55	\$ 1.40
<b>Totals:</b>	<b>4,248</b>	<b>4,308</b>	<b>526</b>	<b>4,834</b>	<b>10.9%</b>	<b>\$ 1.55</b>	<b>\$ 6,590.93</b>	<b>\$ 1.53</b>	<b>\$ 1.36</b>

*6 total loads*

<b>Averages:</b>	<b>708</b>	<b>718</b>	<b>88</b>	<b>806</b>	<b>10.9%</b>	<b>\$ 1.55</b>	<b>\$ 1,098.49</b>	<b>\$ 1.53</b>	<b>\$ 1.36</b>
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## Linehaul Revenue

Linehaul revenue is the revenue paid by the shipper for the pure transportation or mileage portion of the service. In other words, linehaul revenue is the compensation the carrier receives for moving the load from Point A to Point B. The rate will be quoted to the customer as either a rate per mile or a flat charge per load. In most cases, longer distance loads are charged at a per-mile rate and shorter distance loads are charged based on a flat charge per load.

## Accessorial Revenue

Accessorial revenues cover all services beyond the linehaul charges paid by the shipper for the basic transportation service. For example, the customer may require that the carrier's driver unload the trailer at the final destination. In addition to the basic linehaul revenue, the carrier will also charge an accessorial amount (perhaps \$100) as an additional charge for the unloading service. Most accessorial charges are flat fees for each service regardless of the number of billed miles for the load. Many other common accessorial charges, such as stop charges and fuel surcharges, are discussed in detail in later chapters.

### Billed Revenue Per Mile

Billed revenue per mile represents the average amount of linehaul revenue per billed mile and is unrelated to actual loaded and empty miles. All other things being equal, the carrier's goal is to maximize billed revenue per mile relative to other key statistics such as utilization and length of haul.

$$\text{Billed Revenue Per Mile} = \frac{\text{Linehaul Revenue}}{\text{Total Billed Miles}} = \frac{\$6,590.93}{4,248 \text{ miles}} = \$1.55 \text{ per loaded mile}$$

Billed miles represent the "standard" number of miles from Point A to Point B. Billed miles are used for invoicing purposes to determine the linehaul charges for each load. Because the actual physical miles driven on a load cannot be standardized, the actual miles driven by the carrier are not used in determining a customer's charges.

### Loaded Revenue Per Mile

Loaded revenue per mile is closely related to billed revenue per mile. In the absence of any out-of-route miles, loaded revenue per mile and billed revenue per mile will be exactly the same.

$$\text{Loaded Revenue Per Mile} = \frac{\text{Linehaul Revenue}}{\text{Total Loaded Miles}} = \frac{\$6,590.93}{4,308 \text{ miles}} = \$1.53 \text{ per loaded mile}$$

Since out-of-route miles occurred on two loads, the revenue per loaded mile is slightly less than the revenue per billed mile. All other things being equal, the carrier's goal is to maximize loaded revenue per mile relative to other key statistics such as utilization, length of haul, and out-of-route miles.

### Net Revenue Per Mile

Net revenue per mile represents total linehaul revenue on a total-miles basis. It is the most important revenue per mile performance indicator for any carrier.

$$\text{Net Revenue Per Mile} = \frac{\text{Linehaul Revenue}}{\text{Total Miles}} = \frac{\$6,590.93}{4,834 \text{ miles}} = \$1.36 \text{ per mile}$$

Net revenue per mile spreads the loaded revenue per mile over the empty miles to create a "bottom line" revenue amount for all miles. All other things being equal, the carrier's goal is to maximize net revenue per mile relative to other key statistics such as empty miles, utilization, and length of haul.

To avoid any potentially misleading information, it is generally correct to exclude any accessorial revenue from each of these "per mile" measurements. The events that generate accessorial revenue do not occur on all loads or for all customers. Also, the accessorial events and charges do not fluctuate from load to load based on distance, so including accessorial revenue can easily distort revenue per mile measurements.<sup>6</sup>

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<sup>6</sup> The only exception to this rule is fuel surcharges. Total fuel surcharges for a load increase in direct proportion to the number of billed miles for the load.

## Key Operating Measurements and Statistics

All carriers closely measure the operating statistics of each fleet of trucks. Each measurement is a critical component of developing and managing a profitable network. The key operating measurements are described below. These measurements are described in greater detail throughout this book.

### Utilization

Utilization is the primary asset productivity measurement for all carriers. Utilization is the total number of miles (loaded miles plus empty miles) a tractor produces in a given period, usually one week. A one week period is a good standard for measuring utilization, especially since a weekly period is reasonably consistent with the D.O.T. hours of service regulations for drivers. The example report below shows the weekly utilization and summary of activity for a fleet of 7 trucks.

**Weekly Fleet Utilization Report**

Tractor Number	Load Count	Loaded Miles	Empty Miles	Total Miles	Empty Percent	Average LOH
104	4	1,858	245	2,103	11.7%	465
105	3	1,701	282	1,983	14.2%	567
110	3	2,471	312	2,783	11.2%	824
114	5	2,199	283	2,482	11.4%	440
115	2	1,578	188	1,766	10.6%	789
118	5	2,210	201	2,411	8.3%	442
120	3	1,988	310	2,298	13.5%	663
<b>Fleet Totals:</b>	<b>25</b>	<b>14,005</b>	<b>1,821</b>	<b>15,826</b>	<b>11.5%</b>	<b>560</b>
<b>Fleet Averages:</b>	<b>3.57</b>	<b>2,001</b>	<b>260</b>	<b>2,261</b>	<b>11.5%</b>	<b>560</b>

The utilization for tractor 104 was 2,103 miles. The average utilization for the entire fleet was 2,261 miles.

$$\text{Utilization} = \frac{\text{Total Miles}}{\text{Number of Trucks}} = \frac{15,826 \text{ miles}}{7 \text{ trucks}} = 2,261 \text{ miles per truck}$$

Trucking companies focus very closely on the average utilization for their entire fleet each week. If all other key measures remain constant, an increase in utilization results in an increase in revenue and profitability for the trucking company.

Utilization goals are different from carrier to carrier and operation to operation. As a general rule, all carriers seek to maximize utilization for their fleet. However, carriers will not always seek additional utilization at the expense of other key statistics such as revenue per mile and the empty mile percentage.

### Average Length of Haul (LOH)

Average length of haul is the average number of billed miles (or loaded miles) per load for a specific group of loads. In the example report above, the average length of haul for the fleet was 560 miles.

$$\text{Average Length of Haul} = \frac{\text{Total Loaded Miles}}{\text{Number of Loads}} = \frac{14,005 \text{ miles}}{25 \text{ loads}} = 560 \text{ miles per load}$$

Tractor 110 had an average length of haul of 824 miles while Tractor 114 had an average length of haul of only 440 miles. In linehaul operations, the goal of most carriers is to increase the average length of haul or maintain a desirable average length of haul. In short haul operations, length of haul is important but is not as critical as it is for long haul or regional operations.

### Empty Mile Percentage

The empty mile percentage is the percentage of total miles that are empty and without any form of customer compensation. In industry jargon, the empty mile percentage is also commonly referred to as the “deadhead” percentage. In the previous sample report, the empty mile percentage for the fleet is 11.5%.

$$\text{Empty Mile Percentage} = \frac{\text{Total Empty Miles}}{\text{Total Miles}} = \frac{1,821 \text{ miles}}{15,826 \text{ miles}} = 0.115 \text{ or } 11.5\%$$

Much like utilization goals, empty mile percentage goals will also differ from carrier to carrier. Carriers with a very long average length of haul will have a much lower empty mile percentage than carriers with a very short length of haul. The empty mile percentage goal for each operation must be reasonable in relation to other key operating statistics such as utilization, length of haul, and loaded revenue per mile.

Another way to measure empty miles is in terms of the average empty miles per load. Viewing empty miles only in terms of the empty mile percentage can sometimes hide potential problems and opportunities. For example, a load with a length of haul of 1,800 miles and empty miles of 200 will have an empty mile percentage of 10.0%. While the 10% empty percentage may appear reasonable, the 200 empty miles associated with the load may be considered excessive.

Empty miles are a normal part of a trucking operation and cannot be completely avoided. Carriers use a variety of tools and tactics to minimize empty miles while not disrupting normal operations or affecting customer service. Technologically advanced carriers also use real-time optimization tools to identify cost-efficient load assignment solutions.<sup>7</sup> Empty miles are a critical component of one-way pricing strategy and will be discussed in greater detail in the chapters covering one-way pricing.

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<sup>7</sup> These optimization tools are discussed in greater detail in a future chapter.

## Types of Truckload Operations

Truckload operations can be divided into several different categories depending on the type of service to be provided and the type of contractual relationship with the customer. For the purposes of this book, each type of service is defined in terms of how pricing strategy must be adjusted for the different operating characteristics of the network. The major types of truckload operations include linehaul, regional, short haul, and dedicated fleets. Each type of operation is described in the sections below.

### *Carrier Specialization*

While each individual trucking company has its own unique size, network and operating characteristics, the core operating environment of most carriers is the same. Some carriers specialize in a particular strength or market niche. Specialization allows carriers to focus on one particular network, minimize risk, and maximize profits. Several examples of specialization are listed below.

#### **Carrier Specialization Examples**

- A Chicago-based carrier providing full-truckload service only in the Chicago metro area.
- An Atlanta-based regional carrier providing full-truckload service only within a 500 mile radius of Atlanta, Georgia.
- A large carrier operating an irregular route network only in the Eastern two-thirds of the United States.
- A carrier using only teams<sup>8</sup> to provide service on extremely long haul, coast-to-coast type loads.

Regardless of the type and degree of specialization, all carriers face many of the same challenges. The specific types of specialization and scope of services offered influences the carrier's pricing strategy and operating objectives. To fully meet customer needs, large and medium sized trucking companies often provide services that include several types of operations. While different trucking organizations might call these types of operations by different names, the operating characteristics and profitability strategies described below are essentially the same.

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<sup>8</sup> A team is when two drivers share one truck. Usually one driver sleeps in the bunk while the second is driving, allowing for high productivity and faster transit times.



### **Linehaul Operations**

Irregular route linehaul operations are the core service provided by most full truckload carriers. Trucks provide service for semi-random customers throughout a wide geographic service area. The average length of haul for a linehaul operation can range between 500 and 1,200 miles per load, perhaps even more for specialized carriers. The major goals of a profitable linehaul operation are listed below.

<b>Primary Carrier Operating Goals</b>
Maximize Net Revenue Per Mile
Minimize Empty Miles
Maximize Asset Productivity (Utilization)
Optimize Length of Haul

The two most important goals for a linehaul carrier are maximizing productivity (utilization) and minimizing empty miles. These goals sometimes conflict with one another, so trucking managers must make intelligent decisions regarding the tradeoffs among conflicting goals. For example, increasing length of haul will usually cause an increase in tractor utilization but will also result in a decline in loaded revenue per mile. If these tradeoffs are not evaluated correctly, profitability will decline despite the fact that some key measurements are improving. These goals and their interaction with one another will be presented in detail in future sections and chapters.

The table below displays the typical type of activity that would be served by a normal linehaul operation.

<b>Typical Linehaul Lanes</b>		
<b>Origin</b>	<b>Destination</b>	<b>Miles</b>
Jacksonville, FL	Chicago, IL	1,070
Memphis, TN	Newark, NJ	1,087
Charlotte, NC	St. Louis, MO	730
Columbus, OH	Boston, MA	765
Kansas City, MO	Los Angeles, CA	1,617
Chicago, IL	Memphis, TN	533

*Team Linehaul Operations:* Team operations are a special type of linehaul service where two drivers share the driving responsibilities for one truck, allowing for nearly double the weekly miles of a single driver. The goals of the team operation are the same as those for a linehaul operation, but the average length of haul is often much longer. Since fixed operating costs are spread over a larger number of miles, team operations typically benefit from a lower cost per mile than single driver units.

### Regional Operations

Regional operations are irregular-route networks much like linehaul operations. The only major difference is that regional operations focus on a smaller service area, perhaps operating within a 300 to 500 mile radius of a base terminal location. Trucks spend the vast majority of their time operating within the pre-defined service area and return to the base terminal every few days or at least every weekend. The map below illustrates a regional service area based in Atlanta, Georgia.<sup>9</sup>

**Regional Service Area**



Empty miles as a percentage of total miles for regional fleets are usually higher than linehaul fleets. The empty mile percentage is higher mainly because the length of haul is much shorter for a regional fleet compared to a linehaul fleet. The average length of haul in a regional operation will often be between approximately 200 and 450 miles. The table below displays the type of activity that would be served by a regional operation.

Typical Regional Lanes		
Origin	Destination	Miles
Atlanta, GA	Mobile, AL	328
Birmingham, AL	Atlanta, GA	146
Charlotte, NC	Tifton, GA	408

While utilization is a key measurement for regional operations, time management, scheduling, and revenue productivity are also critically important. Because of the shorter length of haul, the carrier must minimize the time between loads in order to maximize revenues and productivity. Pure revenue productivity, even at the expense of lower utilization, is a key element of a profitable regional fleet strategy.

<sup>9</sup> Unless otherwise indicated, all maps in this book were created using Microsoft MapPoint® software.

### Short Haul and Local Operations

Short haul operations are random, multi-customer networks that operate within a very small geographic region. The operations are often based in a major metropolitan area or transportation center and typically focus on a radius of no more than 250 miles from the base of operations. The map below illustrates both a short haul service area and a local service area based in Atlanta, Georgia.

**Short Haul and Local Service Area**



Short haul operations are needed by many different industries. Some of the more common needs are listed below.

<b>Common Needs Met by Short Haul Fleets</b>
Beverage Distribution and Delivery
Automotive Manufacturing (Inbound Shipments)
Retail Distribution to Stores
Facility to Facility Shuttles

Total miles and weekly utilization are not as important in short haul operations as they are in regional and linehaul fleets. The minimization of empty miles is also not a major area of focus. Revenue per truck per week, however, is probably the most important measurement for success. Trucks and drivers must be managed so that their time is used in a productive manner in order to maximize revenue each day. Skillful, knowledgeable customer service managers and dispatchers must aggressively manage customer appointment times and driver hours of service to maximize productivity.

The compensation structure for short haul truck drivers is typically designed around the dynamics of the operation. Unlike linehaul and regional operations, pay per mile is typically only a small portion of the driver compensation package. The short haul pay package often includes a flat fee for shorter loads in addition to per-mile pay.<sup>10</sup>

### ***Dedicated Fleets***

Dedicated fleets are a specialized group of tractors and drivers custom-designed to provide transportation services for a single customer. One unique characteristic of a dedicated fleet is a contractual relationship between the carrier and the shipper under which the shipper has *exclusive* use of a set number of tractors, trailers, and drivers to transport only the shipper's products.

Shippers that require dedicated fleets usually have specialized transportation needs that are best met with customized services. Several examples of special shipper needs often served by dedicated fleets are listed below.

<b>Common Reasons for Dedicated Fleets</b>
Specialized trailer needs
Intensive driver labor requirements
Excessive stop-off deliveries
Challenging service expectations
Heavy activity under 150 miles

Dedicated fleets are attractive to trucking companies because they generally involve less operating uncertainty than traditional trucking operations. Dedicated fleets also typically offer less financial uncertainty because of the detailed dedicated contract relationship. Most dedicated fleets also offer very attractive jobs for truck drivers. Most fleets offer consistent and predictable activity as well as above average home time for the driver. Driver turnover and driver-related problems are often reduced in dedicated fleets compared to typical over-the-road operations such as linehaul and regional fleets.

Dedicated fleets are attractive to shippers because of the guaranteed capacity and excellent service performance. Dedicated fleets can also meet difficult shipper needs that cannot be met in a cost effective manner with typical trucking services. In certain operations, well-designed, correctly priced fleets can also offer shippers significant savings over traditional one-way services. The analysis, design, and pricing of dedicated fleets will be discussed in much greater detail in later chapters.

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<sup>10</sup> Various types of driver pay structures are presented in detail in future sections and chapters.

## ***Specialized Carriers and Trailer Equipment***

Most carriers specialize in the use of a particular type of trailer. In some cases, larger carriers may offer more than one type of trailer equipment. Carriers may also choose to utilize a variety of trailer types within a dedicated fleet environment. The sections below describe several of the most common trailer types.

### **Standard “Dry Van” Trailer**

The standard “dry van” trailer is the type of trailer used in the transportation of most general commodities. This type of trailer will typically transport any product that does not require a more specialized trailer.



**Standard “Dry Van” Trailer<sup>11</sup>**

The majority of the strategies and concepts presented in this book are based on operations that use the standard “dry van” trailer.

### **Temperature-Controlled Trailer**

The temperature-controlled or “reefer” trailer is used to transport commodities that must be protected from heat or cold (usually heat). This type of trailer is often used to transport food, beverages, medical supplies, or other heat-sensitive materials. Because of the refrigeration unit, these trailers are far more costly to own and operate than standard “dry van” trailers.



**Temperature-Controlled Trailer<sup>11</sup>**

## Standard Flat-Bed Trailer

The flat-bed trailer is a specialized trailer used to serve commodities that cannot be easily transported in a standard trailer. Flat-bed trailers are often used to transport awkward, heavy items that cannot be easily loaded and unloaded when using a standard “dry van” trailer. A flat-bed trailer may also be used when the pick-up or delivery location is unable to safely load or unload a standard “dry van” trailer.



**Flat-Bed Trailer<sup>11</sup>**

While the tools and strategies in this book are intended primarily for “dry van” carriers, many of the concepts can also be applied to carriers with specialized trailer equipment such as temperature-controlled carriers and flat-bed carriers.

## Other Specialized Trailers

A number of highly specialized trailers exist far beyond the examples shown here. As trailer specialization increases, the pricing strategy for the equipment also becomes very specialized. While many of the pricing concepts and variables presented in this book apply to all trucking operations, this book does not specifically address pricing strategy for special equipment. However, the concepts and techniques regarding dedicated fleet pricing do apply to any type of trailer equipment when operating under a dedicated fleet contract arrangement.

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<sup>11</sup> All trailer photos courtesy of Wabash National Corporation. For more information, please visit [www.wabashnational.com](http://www.wabashnational.com) and [www.transcraft.com](http://www.transcraft.com).

## Driver Turnover

Driver turnover continues to be one of the most critical issues facing all trucking companies today. Driver turnover is simply the percentage of the total driver workforce that quits and must be replaced during a 12-month period. To the surprise of many outside the industry, the driver turnover for most carriers can range from 80% to 130% or more each year, indicating that each company must, in effect, hire an entirely new staff of drivers every year.

Both the direct cost and the opportunity cost of this problem are extremely detrimental to the stability, growth and profitability of any carrier. The primary direct cost that results from driver turnover is the cost to recruit, screen, hire and train new drivers. Many large carriers maintain an entire department of driver recruiters to manage and meet driver staffing needs. Carriers incur significant costs to place newspaper advertisements, perform background checks on potential candidates, and provide training to new drivers.

A second direct cost of driver turnover occurs in the recovery of the carrier's tractor after a driver quits. Often when a driver quits, the tractor is abandoned at a truck stop, customer facility, or other obscure location. Carriers must incur significant costs just to recover the tractor and return it to service with the next driver. In fact, some large carriers even have a small team of employees whose sole responsibility it is to locate abandoned tractors and return them to a carrier facility.

The primary opportunity cost that results from driver turnover is the revenues and profits that are lost while expensive tractors sit idle without drivers. A carrier with tractors that don't run because of a shortage of drivers is similar to a manufacturer whose plants are temporarily shut down and don't produce any products. Carriers continue to incur significant equipment ownership costs without generating any revenue from the inactive tractor equipment.

Driver turnover also affects carriers in the area of customer service. Idle tractors reduce the amount of capacity available to customers. Even worse, drivers may decide to quit while hauling an important load for a customer, leaving the carrier with the challenge of trying to recover the load with a second driver to still provide on-time delivery.

Carriers must constantly take driver turnover into account as they make many critical decisions, including pricing and network decisions. Shippers can also help carriers with the driver turnover problem in many ways as well. Throughout this book, the impact of driver turnover will be discussed in detail, along with many ways carriers and shippers can work together to prevent and minimize driver turnover and provide a more cost-efficient truckload transportation network.

## Driver Hours of Service Regulations

The United States Department of Transportation and the Federal Motor Carrier Safety Administration have established detailed rules and regulations that govern the amount of time a driver is allowed to drive a truck before being required by law to stop and take a mandatory rest break.<sup>12</sup> The primary purpose of the regulations is to restrict fatigued drivers from operating vehicles in order to prevent accidents and traffic fatalities.

The key components of the regulations place a limit on how many hours a driver may drive and be on-duty during a 24-hour period. As of 2010, the regulations limit a driver to 14 hours on duty in a 24-hour period. Only 11 of the 14 on-duty hours can be spent driving. After 14 hours on duty or 11 hours of driving, the driver must take a full 10 hour break before returning to work. The regulations also restrict how many hours a driver can cumulatively work and drive during any continuous 7 day or 8 day period.

The table below includes the primary hours of service regulations established by the U.S. Department of Transportation in 2003.

<b>Hours of Service Regulations (Revised 2003)</b>	
<b>Daily</b>	Maximum of 11 driving hours per day (24-hour period)
	Maximum of 14 on-duty hours per day (24-hour period)
	10 consecutive hours off duty
<b>Extended</b>	Maximum of 60 driving hours in a 7 day period
	Maximum of 70 driving hours in an 8 day period
	34 consecutive off duty hours resets 7 day / 8 day period

The hours of service restrictions are a critical factor in how carriers set prices and establish driver pay rates. The hours of service restrictions are also a key factor in assigning available drivers to available loads. The specific impact of the hours of service regulations on carrier strategies and pricing analysis will be described in much greater detail throughout this book.

<sup>12</sup> For detailed information on these rules and regulations, please consult the Federal Motor Carrier Safety Administration and Department of Transportation website at [www.fmsca.dot.gov](http://www.fmsca.dot.gov).



## Owner-Operators

The primary fleet for most carriers includes company-owned trucks and company-employed drivers. In addition to company assets, some carriers will choose to expand capacity through the use of owner-operators. Owner-operators are independent contractors that own their own truck and lease the tractor and driver to the carrier. With owner-operators, the carrier is able to expand capacity and increase revenues without investing in additional tractor equipment or hiring additional drivers. In most cases, the owner-operator provides only a truck and driver while the carrier provides all necessary trailer equipment.

The owner-operator is usually paid a fixed rate per mile for all miles traveled. The fixed rate per mile will vary from carrier to carrier based on the expected utilization level for the owner-operator. With the revenue earned from the carrier, the owner-operator must pay all operating expenses associated with the use of the tractor including fuel, maintenance, legalization, insurance, and tractor costs. If the driver is also the owner of the tractor, the amount remaining after expenses is the income for the owner operator. If the driver is not the owner, the driver must be paid by the owner.

The benefit for the owner-operator of leasing with an established carrier is that the carrier will provide the owner-operator with all load activity. Fully independent owner-operators often have a difficult time securing loads. These owner-operators will work through brokers, websites and other resources to find work on a load-by-load basis. Working with an established carrier provides the owner-operator with consistent loads at a fixed revenue level with fewer hassles.

The primary benefit to the carrier of owner-operators is the ability to expand capacity without investing in tractor equipment or hiring additional drivers. Owner-operators are also easier to terminate when capacity must be reduced during slow shipping periods. Most carriers that utilize owner-operators will limit owner-operators to a certain percentage of available capacity to protect the interests of company drivers and to protect against service issues.

Owner-operators are not employees of the carrier and must operate under different dispatch rules than company-employed drivers. As independent contractors, owner-operators have the right to refuse a load and cannot be forced to take a load. As a result, the carrier is always at risk of service disruptions should an available owner-operator refuse to serve a load. If an individual owner-operator refuses loads on a consistent basis, the carrier may choose to terminate the relationship with the unreliable owner-operator.

Carriers usually approach pricing the same way regardless of whether a load will be served by a company driver or an owner-operator. Specialized one-way pricing is rarely designed specifically for owner-operators because the carrier cannot accurately predict the loads that will be served with owner-operators.

## Primary Truckload Operating Cost Components

The principals and concepts in this book require a sound understanding of the operating costs experienced by all carriers. This section provides a basic overview of each major cost. In the chapters to come, these costs will be explained in greater detail and applied to each pricing and analysis concept.

Truckload transportation costs can be broken down into four major variable components and three major fixed components. The variable components include driver compensation, fuel, maintenance, and insurance. The fixed components include tractor and trailer ownership costs, equipment legalization costs, and overhead costs. Overhead costs include computer systems, offices and terminals, and administrative support such as customer service, sales, recruiting, executives, and other support personnel. In some dedicated and specialized operations, certain cost items may change between fixed and variable cost behavior based on the specific characteristics of the operation. The cost definitions that follow are based on a traditional linehaul or regional operation.

### Variable Costs

Variable costs are costs that change in total with each unit of output, but do not change on a per-unit basis. The primary unit of variable output for a carrier is a mile. For example, if truck drivers are paid 35 cents per mile, driver pay is a variable cost. The 35 cents per mile remains constant regardless of the number of miles driven. The table below illustrates the behavior of driver pay as a variable cost.

<b>Miles Driven</b>	<b>Driver Pay Per Mile</b>	<b>Total Cost</b>
500	\$ 0.35	\$ 175.00
750	\$ 0.35	\$ 262.50
1,000	\$ 0.35	\$ 350.00
1,250	\$ 0.35	\$ 437.50
1,500	\$ 0.35	\$ 525.00
1,750	\$ 0.35	\$ 612.50
2,000	\$ 0.35	\$ 700.00
2,250	\$ 0.35	\$ 787.50
2,500	\$ 0.35	\$ 875.00
2,750	\$ 0.35	\$ 962.50
3,000	\$ 0.35	\$ 1,050.00

Notice that total cost increases by \$0.35 per mile for every additional mile. Total cost continues to increase, but the \$0.35 rate of pay per mile remains constant.

Trucking companies incur variable expenses for every mile driven, empty or loaded. Some expenses listed below as variable costs may not truly occur for every mile driven, but a per-mile basis is the best activity base for estimating and managing these expenses.

### Driver Compensation

The most common method for compensating drivers is to pay a fixed amount per mile for every mile driven, empty or loaded. The actual rate of pay a driver receives will depend on many factors including:

- Years of driving experience
- Years of service with their current employer
- Safety and service record
- Potential for the driver to spend time at home
- Expected number of weekly miles to be driven (utilization)

Expected utilization is a key factor in determining the rate per mile a driver will be paid. For instance, in a certain market the average driver may need to earn at least \$900 per week to be satisfied in a truck driving job, regardless of the number of miles he or she will drive. The table below illustrates what this driver might expect to earn per mile depending on the trucking company's expected utilization in the operation.

Driver Pay Per Mile		
Expected Utilization	Desired Income	Pay Per Mile
1,600	\$ 900	\$ 0.56
1,800	\$ 900	\$ 0.50
2,000	\$ 900	\$ 0.45
2,200	\$ 900	\$ 0.41
2,400	\$ 900	\$ 0.38
2,600	\$ 900	\$ 0.35
2,800	\$ 900	\$ 0.32

Utilization and income for an average weekly period.

*Cost Behavior:* In normal linehaul and regional operations, driver pay is a per -mile variable cost. For every mile driven, the driver will earn his base rate of pay per mile.

### Driver Fringe Benefits

Fringe benefits for drivers, much like any employee, include costs such as employment taxes, vacation pay, health insurance, and employer-funded retirement plans. These costs are directly related to the driver's income, usually on a percentage basis. While this type of expense is not directly related to any other business activity, it is easily estimated as a percentage of driver pay. Depending on the level of fringe benefits provided by the carrier, this percentage could range anywhere from 15% to 35% of driver earnings.

*Cost Behavior:* Since many of the fringe benefit cost items are based on a percentage of driver compensation, which is primarily per mile, these expenses are generally considered to be incurred on a per-mile basis concurrent with variable driver pay.

## **Fuel**

Fuel is a major cost component for all trucking companies. Trucks consume fuel both while driving and while idling.<sup>13</sup> Idling occurs as drivers take mandatory rest breaks in their trucks and leave the truck running for comfort. This “idle time” must be managed carefully to avoid the excessive use of fuel during driver breaks.

*Cost Behavior:* Fuel is purely a per-mile expense. The cost of idle time will average out over all the miles driven, so the fuel expense is incurred on a per-mile basis. Fuel cost per mile will vary significantly depending on the price of fuel, the fuel economy of the tractor, and the driving conditions.

Carriers manage the risk of changes in the cost of fuel through a fuel surcharge agreement with customers. The fuel surcharge agreement establishes the “fuel peg” as the base cost of fuel. If the actual price of fuel is higher than the fuel peg, the customer incurs an additional charge for the higher cost of fuel. If the actual fuel price is lower than the fuel peg, the carrier will discount the customer’s invoice relative to the price of fuel. The fuel surcharge process is presented in greater detail in an upcoming chapter.

## **Equipment Maintenance**

Equipment maintenance includes such items as oil changes, new tires, tune-ups, brake jobs, replacement parts, and all types of preventive maintenance and repairs. Replacement tires and tire repairs comprise a large portion of maintenance costs for both tractors and trailers.

*Cost Behavior:* Since tire wear and other maintenance needs occur naturally on every mile, maintenance costs are incurred primarily on a per-mile basis.

While most maintenance costs are directly related to miles, some costs of maintenance such as facilities, management, tools and equipment might be considered fixed overhead costs because they do not change based on the number of miles driven.

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<sup>13</sup> Idling is the act of running a truck’s engine while the trucking is not in motion. Often, when the driver is taking a rest break, the truck will continue to run in order to provide heat or air conditioning for the driver.

## Insurance

Insurance is a major cost for a carrier of any size. In recent years, the cost of liability and cargo insurance has soared, placing a financial strain on many carriers. Because of the risk of catastrophic accidents, all carriers must carry the required legal amounts of insurance. The cost structure and cost behavior for different types of insurance policies will vary from carrier to carrier.

*Cost Behavior:* The cost of these insurance premiums is based on many factors, with expected total miles in a given period playing a key role in costs. Miles and utilization are key factors in how the insurance provider determines insurance premiums. For this reason, insurance is generally considered a per-mile cost even though the insurance premiums may be fixed for a short period, regardless of actual miles. Exposure to potential accidents also increases in proportion to the number of miles driven.

## Fixed Costs

Fixed costs are those costs that do not change with total output but will vary on a per-unit of output basis. For example, one major fixed cost for a carrier is the fleet of tractors. The cost of each tractor is fixed regardless of the amount of miles the truck generates each week. However, as the truck runs more and more miles, the tractor cost per mile declines as the fixed cost is spread over an increasing number of miles. Spreading fixed costs over a large number of miles (units of activity) is a key profitability goal of almost all truckload carriers.

## Tractor Equipment

The cost of tractors is a major fixed expense item for all carriers. While most carriers purchase and own their fleet of trucks, some choose to lease a fleet of tractors instead. Carriers that own their trucks will depreciate them over the expected useful life of the equipment. Equipment depreciation or lease expense is a fixed cost.

*Cost Behavior:* In the short run, tractor depreciation or lease expense is a fixed cost on a per-tractor basis. In the long run, carriers can reduce the size of the fleet if necessary in order to reduce the overall fixed cost burden.

Tractors are often equipped with satellite tracking and sophisticated on-board computer systems. The cost of the tracking equipment is usually handled in much the same way as the base tractor costs.

## Trailer Equipment

The cost of trailers is a major fixed expense item for all carriers. While most carriers purchase and own their fleet of trailers, some choose to lease trailers instead. Carriers that own their trailers will depreciate them over the expected useful life of the equipment. Equipment depreciation or lease expense is a fixed cost.

*Cost Behavior:* In the short run, trailer depreciation or lease expense is a fixed cost on a per-trailer basis. In the long run, carriers can reduce the size of the trailer fleet if necessary in order to reduce the overall fixed cost burden.

## Equipment Legalization

All tractors and trailers must be registered with state or local authorities each year. The majority of this cost is for tractor and trailer registration and legalization.

*Cost Behavior:* Equipment legalization is a fixed cost on a per-tractor and per-trailer basis in the short run. As the fleet size changes, total legalization costs will increase or decrease in relation to changes in the fleet size.

## Driver Recruiting Overhead

Because of the enormous problem of driver turnover, large trucking companies employ a staff of driver recruiters and advertise driver job openings aggressively in newspapers, on billboards, through employment services, and on the internet. Smaller carriers will often utilize outside driver recruiting firms and word-of-mouth to meet driver hiring needs.

*Cost Behavior:* The salaries of the recruiters and the advertising expenses are true fixed costs. As trucking companies grow, the need for recruiters and advertising will likely increase, but in contrast to equipment legalization above, this cost will not typically change on a direct, per-truck basis.

## Direct Support Staffing

The direct support staff includes all those employees directly involved in the process of booking and dispatching loads such as customer service personnel and dispatchers. The salaries for these staff members comprise a large portion of the fixed overhead costs.

*Cost Behavior:* The base support staff is a fixed cost for the organization. As the company grows and adds new trucks, the cost of new personnel that will need to be added to support growth is a step cost.<sup>14</sup> The salary of each new employee represents a “step” in cost.

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<sup>14</sup> Step-pattern costs are costs that increase or decrease in total over a range of activity greater than a unit-by-unit basis. Step-pattern costs are fixed over a small range of activity but variable over a large range of activity. For example, suppose a dispatcher can manage a maximum of 40 drivers. The carrier would need only one dispatcher until the company grows to 41 drivers. At that point, a “step” increase in cost will occur as the company hires a second dispatcher to handle the growing workload.

## **Corporate Overhead**

Corporate overhead includes many of the costs associated with any company, regardless of industry. Typical corporate overhead includes such costs as executive salaries, advertising, and office expenses. Corporate overhead also includes the staffing and other costs in such departments as accounting, marketing, human resources, and management information systems.

*Cost Behavior:* Corporate overhead is a pure fixed cost on an annual basis. In a trucking company, these costs will change very little in total even if the number of trucks or number of miles changes significantly. One exception is when a carrier's operating software provider charges a variable fee for each truck or driver that is managed within the system.

In large carriers, corporate overhead can be significant in terms of total costs. In small carriers, overhead costs are usually kept relatively low. Regardless of the size of the carrier, the goal is to expand the fleet and increase utilization to reduce the overhead cost per mile.