

# Developments in Business Simulation & Experiential Exercises, Volume 14, 1987

## LTL I: A Trucking Simulation Game

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### ABSTRACT

LTL is a hand scored, computer assisted game for teaching students the basics of managing a less than truckload (LTL) trucking operation. Students must develop an overall strategy by selecting the number and locations of terminals, the rates to be charged and the size and composition of their fleet of trucks. Once the company is established the students must operate their company on a day to day basis. Daily operations involve dispatching trucks to pickup and deliver freight moving between ten different markets. They will attempt to serve as much demand as possible while minimizing the miles traveled and maximizing the use of vehicle capacity.

### INTRODUCTION

"It is not very difficult to have a successful trucking operation. All you have to do are five things: First, get the freight from the point of pickup to the point of delivery as rapidly as possible. Then, do it with as little loss and damage as possible. If you can do both of these things, you will get a lot of business. To make sure you get as much as possible, you have to go out and tell everybody what a good job you are doing. Once you have acquired the maximum possible revenue, you must see to it that you load the maximum possible freight revenue per mile into each of those trucks and trailers. Then, you keep your costs as low as possible. If you can do all five of those possibilities, you make the most money possible, and that's all there is to it" [5, p. 456].

These concepts remain the foundation principles on which the trucking industry is based today 30 years since this statement was made. Though the environment of the trucking industry has evolved from strictly controlled and regulated to something approaching a highly competitive free market, the basic principles mentioned above are even truer today than they were in 1956. Good service and careful cost control spell success. However, putting these simple truths into practice is not as easy as it sounds.

In the Less Than Truckload (LTL) business the carrier sells a service. Its demand is immediate and must be met in the same manner. A simple LTL setup consists of several trucks and a pickup/delivery terminal. The terminal is the heart of the operation. At the terminal, shipments are collected from nearby customers, unloaded and consolidated into delivery trucks with other packages headed in the same direction. Incoming shipments are unloaded, sorted and delivered. The pickup and delivery terminal also functions as a sales office, and as a place where billing, claim handling, and limited vehicle maintenance is performed.

"LTL" I is a developing educational hand scored simulation game of the less than truckload (LTL) trucking industry. It is intended for use in business logistics and transportation management courses. The game places the player in the role of an executive decision maker. The players will not be competing against the game itself, but the other teams. The

teams interact among themselves creating their own unique competitive environment. Through this process the players will learn about decision variables in the industry and their interdependencies. The player's knowledge of the industry and how to adjust to the changing environment will expand as the competition grows and the game progresses.

There are currently no games available for teaching transportation management. There are several logistics games such as LOGSIMX at Indiana University [1] and BOY GEORGE [3] which contain transportation as an important component but do not treat it in detail. The logistics games are also oriented toward shippers of products rather than to carriers of products. AIRWAYS [2] is a game in which the student manages the marketing of an airline, the student is involved in making marketing decisions for their airline. There are no games available which place the student in the position of the operator of a transportation company.

### NATURE OF THE GAME

The task for each team/company is to design and operate a less than truckload (LTL) trucking service to a self-contained region with ten markets. Each market will generate a stochastically determined quantity of demand, for each of the other nine markets each day of play. Demand is expressed in cubic feet. The portion of the demand or market share for each company will be determined on the basis of previous service levels to that market pair and the company's relative rate level. Each company must then pickup and deliver its share of the freight as efficiently as possible. Demand must be serviced as quickly as possible but in such a way that the number of miles traveled is minimized and vehicle capacity is used to the maximum. If a company decides not to pickup freight from one market because it would be too costly, the freight will still be there tomorrow but its share of the market will decline in future periods. Teams are evaluated on their profit performance.

### PLAYING THE GAME

At the beginning of each game the teams must design their company. They are given a history of freight demand for each market pair and the mileages from and to each market as well as several major highway intersections. Each team must then decide the following: (1) locations of its terminal or terminals, (2) size and composition of its fleet of trucks, and (3) rates to charge between each market. Terminals can be located at any market or major highway intersection. Each company must have at least one terminal. The number and location of terminals cannot be changed once the game begins. There is a fixed charge per day per terminal of five hundred dollars.

Each team can choose two types of vehicles for its fleet: (1) a tractor and semi-trailer with 3,000 cubic feet of capacity costing \$1.00 per mile to operate and \$60.00 per day in fixed costs and (2) a straight truck with 1,500 cubic feet of capacity costing \$0.75 per

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mile to operate and \$25.00 per day in fixed costs. In addition, extra semi-trailers can be purchased for \$15.00 per day in fixed costs. The size and composition of the fleet can be changed during the game but with a five day waiting period from the time of the decision. Rates from and to each market must be set before play can begin but they can be changed daily during the game. Once the basic system is established, the game can begin. Demand is generated from a normal distribution using a random number for each market pair in both directions. Initially, each team is given equal shares of each market. The daily task of each team is to pickup and deliver freight for its customers. All freight must go through a terminal during its trip from its origin to its destination. There is a \$0.10 charge per cubic foot for handling at each terminal. The first task of each day is to pickup freight by dispatching each vehicle to a specific market or markets. Demand is known for the day and it must be decided which vehicles will be sent to which market(s). Trucks can go to more than one market but there is a \$20.00 stop-off cost. The next task is to deliver the freight that was picked up. Again, it must be decided which vehicles will make which deliveries. For both pickups and deliveries, the company will attempt to service all of its demand while minimizing miles traveled and maximizing vehicle capacity. The team may choose not to satisfy all of its demand on a particular day because of costs or capacity constraints. Demand not satisfied today is added to the next day's demand.

After pickups and deliveries have been made, the team must decide whether to change its rates and fleet of trucks. Rates go into effect immediately while fleet changes take five days.

In summary, the following decisions must be made each day: (1) dispatch trucks to pickup customer freight, (2) dispatch trucks to deliver customer freight, (3) change rates, and (4) change fleet.

### ADMINISTRATION OF THE GAME

At this stage, LTL I is still a hand-scored game which forces students to understand and at least conduct all of the necessary calculations. The primary disadvantage is that the administrator must check everyone's computations and keep records of performance.

The daily costs and revenues are as follows:

|                               |         |
|-------------------------------|---------|
| <b>Fixed costs per day</b>    |         |
| Terminals                     | - \$500 |
| Semi truck                    | - 60    |
| Straight                      | - 25    |
| Trailers                      | - 15    |
| <b>Variable costs</b>         |         |
| Miles traveled semi truck     | \$1.00  |
| Miles traveled straight truck | 0.75    |
| Cubic feet handled            | 0.10    |
| Stop off cost                 | 20.00   |

**Revenues (per market pair)**  
Rate x cubic feet moved between markets

The fixed costs per day are the easiest to calculate. The variable costs are more complex because there are 50 mileages which must be calculated per team. The total cubic feet handled per team is not difficult to calculate. The most

complex task for the administrator is to calculate revenues and demands for each team because there are 10 x 10 demands. The demand and revenue from each point to each point must be calculated. In addition, market shares for each team for each market pair must be determined. Further, each team will have their individual rates from and to each market which they can change each day. Fortunately, these can be determined and maintained in a structured manner.

The game should be played for at least 10 periods so that the full effect of various decisions and strategies can be played out.

In the latter stages of the game the administrator may wish to allow teams to bid for business on a contract basis. In other words, the carrier could lock up all of the freight between certain pairs of markets for a long period of time.

The number of teams should be between three and five - three so that a sufficiently competitive environment will be created and five so that the mental health of the administrator will not be too severely tested.

### CONCLUSION

LTL I is a transportation management game and as such fills a void or niche. It is relatively simple but like many games presents the student with a surprisingly complex task. It is designed to give the student a feel for the day to day operations of a freight company but more importantly the student must confront the challenges of developing an overall strategy. The game has been designed to be as simple as possible while still retaining the essential decisions faced by a transportation company.

### REFERENCES

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