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# THE ALL-TRAILER - A PERISHABLE DISTRIBUTION SYSTEM

by  
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## Company Background Information

Alterman Grocery Company of Atlanta operates 94 supermarkets as Big Apple, Food Giant and K-Mart. Fifty-three of these stores are in the Atlanta Metro area and are serviced by the All-Trailer System. Alterman also services 350 independent stores. Total annual volume for all operations is \$300 million.

## The System

The All-Trailer system is designed to provide an improved method of delivering perishable products, achieving quality control and insuring consistent service to retail stores.

It combines three principles:

- (1) Mixed loads of frozen food, fresh meat and produce
- (2) Constant temperature control through nitrogen refrigeration
- (3) Improved materials handling through unitized carts (mobile floats).

## The Problem

The traditional delivery of frozen foods, meats and produce on three separate trucks, making seven to ten

stops, was not satisfactory. Frequent stops resulted in loss of trailer temperature and, due to summer temperatures and humidity, mechanical refrigeration could not function efficiently (iced coils). Quality loss in product was a major factor in the need to develop an improved delivery system.

Trailer efficiency was becoming more critical due to more difficult delivery schedules causing considerable delay in retail operations.

## The All-Trailer

A 42-foot trailer with improved insulation and air tight construction. Five inches of insulation in the floor, ceiling, nose and tailgate. Only two inches on side walls to permit 90 inch interior width.

Trailer capacity is 24 unicarts (floats). Three carts wide and eight deep to exactly fit the width and length of the trailer. Carts are 29" x 59" x 72" height. The trailer floor design was changed from a deep groove design to a smoother surface, which made rolling the carts much easier.

The trailer may be divided into three compartments by movable insulated

bulkhead doors. Compartment lengths can be varied to match the exact requirements for each load.

The liquid nitrogen refrigeration system is equipped with a 100 pound nitrogen tank (-360°F), control valves for front and middle compartment, thermocouples and spray heads. Produce compartment is maintained by gravity flow through port holes in the bulkhead.

Frozen food unicarts are rolled into the nose compartment first and locked in place. The bulkhead is closed behind the three abreast carts, forming an air tight compartment capable of maintaining freezer temperatures (+3°F to +5°F).

Boxed meats and unitized produce are assembled from the picking line at refrigerated dock. Unicarts of meat and dairy are now loaded and the bulkhead door secured behind the load. Temperature will be maintained at 28°F to 32°F.

Produce units are rolled into the tail compartment. Bulk bins complete the load. The trailer is sealed and nitrogen valves activated.

#### Store Delivery

After spotting the trailer at store dock or unilift, the driver closes the valves and store employees begin receiving the twenty-four carts. Product is rolled directly to freezers, coolers, and display. Empty carts from previous order are returned.

#### Savings

The system of having all perishables on one truck making one delivery

to one store resulted in several advantages over the previous system of separate delivery trucks for frozen foods, meats, and produce.

Improved quality maintenance is due to accurate temperature control, less product exposure during store receiving and the positive effect of humidity control. Having all products on one truck allows the driver to drop a full load and either help unload or pick up an empty trailer and return immediately to the warehouse. This provides more flexibility in scheduling, resulting in improved efficiency and equipment utilization, and a reduction of approximately 25% in personnel and equipment.

The nitrogen system requires 1/3 less maintenance, a \$7,000 reduction in spare parts inventory, and \$2,000 less capital investment per trailer unit.

#### Increased Costs of Refrigeration

The operating costs for the nitrogen is, however, some 35 cents per hour more (95¢ to 60¢). Based on an eight hour operating day, six days per week, the annual operating costs are nearly \$1,000 higher.

#### IN SUMMARY THE ECONOMIC ADVANTAGES ARE:

- (1) Improved product quality at delivery
- (2) Reduced store delivery time, one hour vs. four hours
- (3) Increased reliability of delivery
- (4) More efficient for equipment and drivers

- (5) Less Maintenance
- (6) Lower spare parts inventory
- (7) Lower capital costs

These factors are offset slightly by the higher operating costs.

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## A SIMULATION APPROACH TO ANALYZING ALTERNATIVE DISTRIBUTION SYSTEMS FOR SMALL FOOD STORES

by  
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Distribution costs continue to be a major factor in the price of food at the retail level. The impact is especially critical in small food stores, where the distribution is often characterized by many short-haul deliveries that begin with a partial load and many routes that are duplicated by various distributors. Because of ever increasing labor, fuel, and equipment costs, distributors of all sizes must continually reappraise the economics of their operations. The purpose of this research was to develop an effective means by which management can predict the cost benefits of alternative food distribution systems. Studies of delivery systems serving small food stores were conducted in western Pennsylvania under a cooperative agreement between the Agricultural Research Service and the Pennsylvania State University.

The result of initial studies was the development of a simulation model, CONSOL, which utilizes the Fortran IV language. The program has been refined to include an abundance of comment statements to aid the user and simplified programming instructions which include a complete glossary of terms.

CONSOL was validated in three experiments. In the first experiment the study team compared separate daytime deliveries of dry groceries and bakery items to 19 convenience stores with consolidated night time deliveries of the two commodity categories to the same 19 stores. Actual operating data were collected primarily from company records and time studies and used in the simulation program. Simulation results indicated that consolidation could produce a 48 percent reduction in total annual costs of distribution of