

**The Kroger Company  
Box 1010 Cincinnati, Ohio**

**Technical Division**

April 10, 1999

Elaine Bari, Vice President,  
Kroger Company, Southeastern Region  
1500 Peachtree Street  
Atlanta, GA 30301

Dear Ms Bari:

On March 26, 1999, you requested that Technical Division analyze operations at the Southeastern Distribution Center and recommend efficiency improvements. The study had a completion date of April 10, 1999.

Enclosed is that study, recommending a series of changes in operations. We are available to discuss the study with you at your convenience. I am coordinating follow-up and can be most easily reached at [mroberts@corpotech.kroger.com](mailto:mroberts@corpotech.kroger.com)

We would like to extend our thanks to Michael James who gave many hours to familiarizing us with the Center's operations, answering our questions, and putting us in contact with Center, store, and vendor personnel.

Sincerely,

Mark Roberts

Encl.: report: Reducing the time required for reception and shipping of food products at Kroger's Southeastern Distribution Center

## **Executive Summary**

Increased shipping volume has strained the resources of the Southeastern Distribution Center. At present, the Center staff is unable to handle the volume or control these volume variations, resulting in \$243,720.00 for overtime during the last fiscal year. This report recommends that the Center operations be modified to equalize the daily volume, that additional vendors deliver directly to stores, and that an additional delivery bay be added to the Center. The cost of the added bay will be \$128,700, and it can be completed three months after construction is authorized. The cost of other recommended changes is nominal.



# The Kroger Company

## **Reducing the time required for reception of food products at Kroger's Southeastern Distribution Center**



Prepared for:

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## Introduction

On February 3, 1999, Corporate Engineering was tasked to assess the problem of excessive volume and consequent high overtime pay at the Southeastern Distribution Center and recommend cost effective improvements. A three-person industrial engineering team was assigned to the project and began work on February 27. At the initial meeting with the Southeastern Region VP, Corporate VP of Engineering, and the project team, it was agreed that the study would include:

- Detailed assessment of factors specific to the site
- Consideration of key factors external to the site

In addition, it was agreed that any proposed solution would:

- have a payback period of eighteen months or less
- be approved by both Company's Legal and Industrial Relations Departments

The project was given a budget of \$38,000 and a completion date of April 10, 1999. This will be an internal project; no consultants will be used, and neither the data collected nor the completed report will be released outside the company.

### Causes of the problem

Throughout FY 98-99 and into FY 99-2000, the Distribution Center has shown a steady increase in overtime. Ongoing analysis of this issue by Center staff indicated two primary causes

- One is increased overall volume. The present Distribution Center was built in 1996 to serve the region's seventy-six supermarkets. Since that time, nine additional stores were added to the region, but the Center was not expanded. The Center now has built-in inefficiency resulting from the fact that it constantly operates beyond capacity.
- The other is a growing fluctuation in daily outbound volume. The outbound fluctuation results from unpredictable changes in the nationwide food buying patterns. In the past, grocery buyers could be assumed to make most of their purchases on Friday nights and on the few days prior to major holidays. Today, factors ranging from buyers' more complex personal schedules, increased use of frozen foods, and improvements in home refrigerator efficiency and size, have made grocery purchase patterns much more difficult to predict.

### Earlier efforts to solve the problem

Efforts were made to solve this problem in 1997 and 1998. In 1997, following an internal study by region management, three additional workers were hired to work 40-hour weeks on an irregular schedule as required by workload needs. Initially, this reduced mandatory overtime for other workers, but as volume continued to climb, mandatory overtime returned to its previous high levels.

In 1998, following a study by corporate engineering, additional material handling equipment was installed to increase the speed of loading and unloading. The new equipment achieved some efficiencies but has not been able to fully compensate for increased volume. The 1998 study recognized that volume would continue to climb and predicted the need for a substantial expansion of the Center by 1999.

### Scope of the Study

The standard initial analysis of problems of this kind concentrates on the efficiency of:

1. the shipping and delivery process
2. the tracking of specific items within the warehouse
3. the order picking process
4. the materials handling process
5. the ordering system
6. the delivery process

While this problem is currently seen in terms of in staffing and overtime issues, initial analysis indicates that its causes lie in three of the areas listed in "Scope" above:

#### 1. The materials handling process

As more stores have been added and an increasing customer base has added to the volume of existing stores, the volume of products moving through the Distribution Center has increased substantially while there has been only a minor increase in the Center's ability to handle such volume. As a result, goods awaiting shipment have intruded into the delivery and shipping space. This has affected the efficiency of both shipping and delivery time and order picking time. In consequence, the efficiency of the Center has been significantly reduced.

#### 2. The ordering system

Each of the stores uses a just-in-time delivery system, placing an order 24 hours before the store predicts that it will exhaust supplies of a specific item. This is efficient for the stores, but it places constant, urgent, unpredictable demands on the Distribution Center.

### 3. The delivery system

Apart from deliveries made by the largest national vendors directly to stores, all goods being shipped to stores pass through the Distribution Center. This unnecessarily adds to the Center's volume.

## Constraints on possible solutions

We were required to consider these issues in terms of two constraints imposed by management.

1. Management has directed that all proposed solutions have a payback period of eighteen months or less.

This constraint negates the obvious solution, the Center expansion recommended in the 1998 report. This expansion will cost in excess of \$10,000,000.00 and has a projected payback period of approximately nine years. A partial solution of this kind, a redesign and partial re-equipping of the present Center, will cost approximately \$6,300,000.00. While it would increase efficiency, it would never fully pay for itself.

2. Management has directed that all proposed solutions be approved by both Company's Legal and Industrial Relations Departments.

Our team's initial review of the problem and initial discussion with the Legal and Industrial Relations Departments have allowed us to specify these constraints in more detail. Our current national contract with the Teamsters' Union which represents the hourly employees at all of our distribution centers requires the following:

- we can increase overtime only by paying time-and-a-half for all hours over 40 hours. Any part of an hour must count as an hour.
- Sunday work will be paid at double time.
- shift differential pay of \$0.50/hr for second shift (3 PM - 11 PM) and \$0.65/hr for third shift (11 PM - 7 AM) applies
- employees on swing shifts are paid based on the pay for the specific hours worked.
- employees must accept overtime if so directed by management.
- Temporary employees can be hired for up to three continuous 40-hour weeks at the union pay rate as long as no permanent employees are displaced.
- part-time employees can be hired at the union pay rate as long as no permanent employees are displaced.

Memoranda from Legal and Industrial relations detailing these constraints are included as Appendices A and B.

## Assessment of the ordering system

The team began with an assessment of the Center's record of average volume shipped by day.

A chart of the volume is included as figure 1 below.

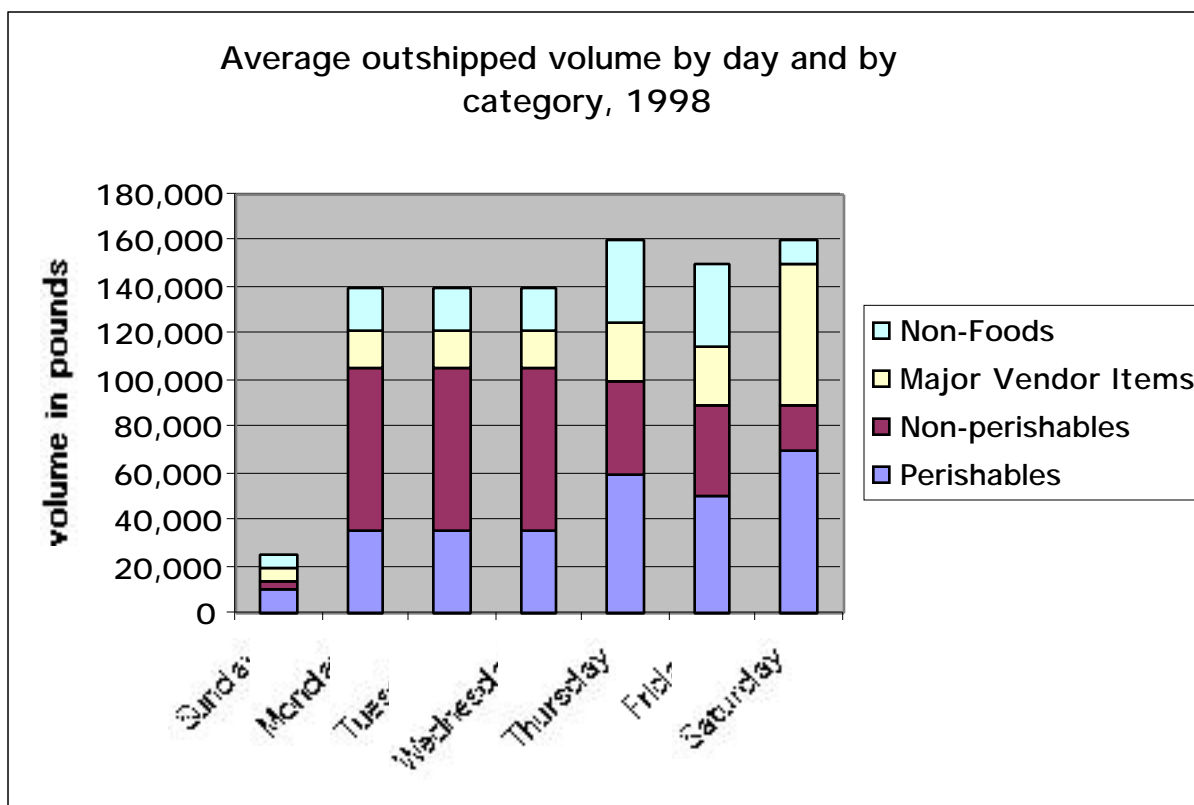


Figure 1: Average outshipped volume by day and by category, 1998

Initial analysis of the data indicates a predictable pattern, with the lowest volume on Sunday in preparation for the traditionally light Monday shopping, equal shipments in early and mid-week, and heavier shipping on the last three days of the week to accommodate heavy weekend shopping.

The team then performed two, more detailed studies.

The first was analysis of the specific items shipped on specific days. Each day's shipment was divided into "major vendor" and "non-major vendor" items. The "non-major vendor" category was further divided into "perishables," "non-perishable foods," and "non-foods." The results are shown below in figure 2.



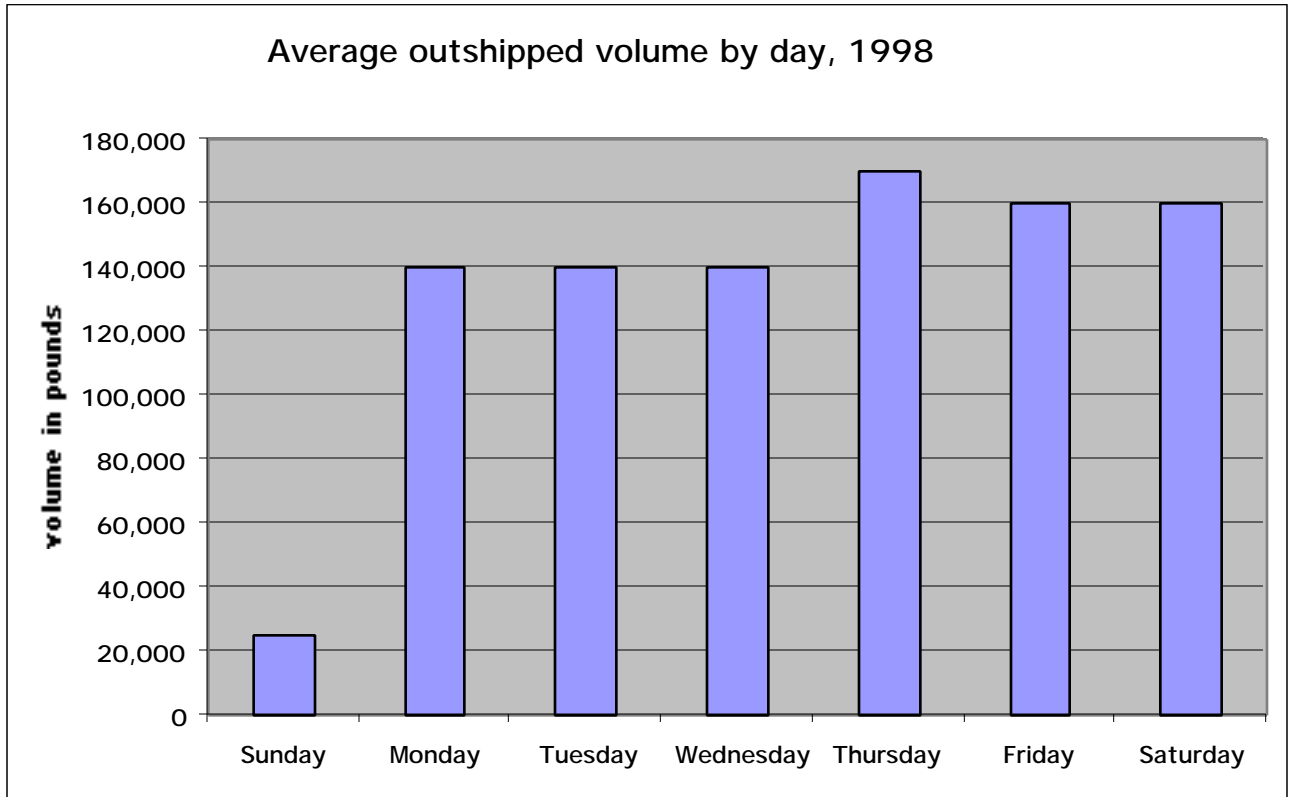


Figure 2: Average outshipped volume by day, 1998

Analysis of these numbers indicates that a reallocation of the non-perishable items from heavy to light shipping days, could provide a level shipping load and consequent steady staffing for six days of the week and a very light load on Sunday, which is the most costly day in terms of labor.

Such a reallocation would require that the stores provide space for temporary storage of items during the week. However, analysis of stores' floorplans indicates that such space could be made available.

The second more detailed study involved an analysis of predictable variances in store orders. The team's initial survey indicated the following patterns.

Outshipped volume increased by:

- 22% in the two days prior to Christmas
- 17% in the Saturday before Easter
- 8% in the Saturday before the Independence Day holiday
- 12% in the two days following a targeted marketing campaign

Outshipped volume decreased by:

- 10-12% following a holiday
- 4% in the third and fourth day following a targeted marketing campaign

A review of the literature indicates that more detailed analysis of multi-year data could yield additional conclusions. The literature indicates that non-recurring events also affect volume. For example, in a number of related industries, product volume:

increases

- 5% following the announcement of a Winter storm
- 3% in the day before a major televised sports event

decreases

- 18% in response to heavy rainfall

Thus our study indicates that the daily outshipped volume can significantly leveled by both using shipment of non-perishables as a balancing factor and by using historical data to predict and compensate for heavy demand from stores. The study also indicates that additional approaches are available to further refine the load leveling process.

## Assessment of the delivery system

Our study indicates that that part of the Center's volume problems stem from using the Center to ship items that could be more effectively shipped by the vendor. At present, From 12% to 15 % of the total volume is being delivered directly to stores by vendors. All of these deliveries are based on Kroger's national contracts with national vendors.

A detailed study of the volume of individual products indicates that an additional 10% of the total volume could be delivered by regional vendors. We based this decision on two criteria:

- each of our stores in the region could be served by a weekly order of at least a half-truckload
- the vendors currently maintain a trucking fleet and provide weekly deliveries to at least some of their customers.

The list of products recommended for direct delivery is provided in Appendix C.

## The materials handling process

Major efficiencies in shipping and delivery can be achieved only with a Center redesign and the installation of new product handling equipment. Both of these solutions are barred by the requirement for 18-month return on investment.

However, some efficiency can be achieved at low cost by proper use of the space made available by handing of additional responsibility for direct delivery. We recommend the following:

- install an additional delivery bay at the extreme south side of the loading dock, thereby increasing the delivery volume by 10%.

- reassign four employees from the currently overstaffed bays to staff the new bay.

Cost of this construction will be \$128,700, and construction will not interrupt Center operations. (See Appendix D for contractors' bids.)

## Conclusions

The growth of the Southeastern Division has overloaded the Southeastern Distribution Center, making it less efficient and increasing labor costs, especially those based in overtime and hiring of temporary employees. As the Southeastern Region continues to grow, a substantial expansion of the Center will be required as recommended by an internal study in 1998.

However, the efficiency problem can be reduced in the short term by balancing the daily volume, requiring vendors to deliver a greater percentage of good directly to stores, and adding an additional delivery bay to the Distribution Center.

The total cost of these changes will be \$128,700 for bay construction, and this cost will be more than compensated for by savings in the \$243,720 presently spent on overtime.

## Recommendations

1. Provide a uniform and predictable daily workload by adjusting the daily shipment of non-perishable items.
2. Arrange for vendors to deliver 10% of the current Distribution Center volume directly to stores.
3. Construct one additional delivery bay in the Distribution Center, and staff it with extra personnel currently staffing other bays.