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Case Study:

PDQ Office Products

U.S. Distribution Strategy

Peach State Integrated Technologies
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Contact information

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Project Overview

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Project Background

PDQ Corporation is seeking a Distribution Network plan that will deliver high service levels during a period of growth.

- **Existing Facilities -** PDQ currently has a single distribution center (DC) located in central NJ. All customers in the United States receive their shipments directly from this DC.
- **Expansion -** PDQ initially targeted the New York metro area and the northeastern states. A large untapped market exists in the rest of the country, and PDQ must consider how to serve these customers.
- **Service Levels -** TPDQ's promise of quick delivery is central to the philosophy of the company. In Europe, most customers can expect 24 hour delivery. The goal of this study is to explore several service level scenarios for the US market and show the type of distribution network that would be required to achieve each target.

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Project Objectives

Peach State and PDQ agreed on the following project goals and objectives to ensure success.

- **Examine the historical demand**: Build profiles of typical customer orders to understand the current network.
- **Project future demand:** Identify key markets that will be served in the future.
- **Rate the current network:** Detail the service levels that can be achieved with the existing facility.
- **Design a network for the following scenarios**:
  - Baseline – Central NJ only
  - How many DC's to reach 100% of the US in 24 hours?
  - Best 1, 2, and 3 DC networks (3 scenarios)
  - Best Central NJ + 1 DC network
  - Best Central NJ + 2 DC network
- **Identify service levels:** With each scenario, calculate how many customers can be served in 1 day, 2 days, or more.
- **Review existing warehouse:** Make recommendations around space efficiency and process improvements.

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Project Approach & Methodology

Peach State used historical shipment data and information about target markets to build a model of PDQ's network.

- **Input Data:** PDQ provided detailed information about products, order activity, and shipment methods. The sample data provided covered June 2001 to June 2002.
- **Demand Analysis:** Peach State examined the data and built profiles of the typical customer order, daily order activity, and shipment method. This data was also used to do a product velocity study which identified the fastest moving products.
- **Customer Location:** PDQ provided the BPIA buying power index which describes the population of office workers in each U.S. county. This data was used to identify the largest metropolitan areas in the U.S. which are important strategic targets for PDQ.
- **Network Modeling:** A detailed model of the network was built using the data profiles. Using this model, Peach State located facilities to meet customer demand. This approach minimizes distance to the customer base and meets service level targets.
- **Scenario Analysis:** A baseline scenario was compared with several other alternatives. Detailed maps and service levels are provided for each scenario. These will provide PDQ with a strong foundation for strategic expansion.

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Demand Analysis

“What does the typical order look like?”

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Demand Analysis

Peach State used historical data to build profiles of PDQ's shipping activity and customer demand.

Data was used to answer key questions:

- How many orders are received each day?
- Are sales levels increasing over time?
- How many shipments are sent via LTL carrier? Parcel carrier?
- What does the average order look like? How many products? Average sizes? Total weight?
- Which products are the fastest moving? What percentage of activity do they represent?

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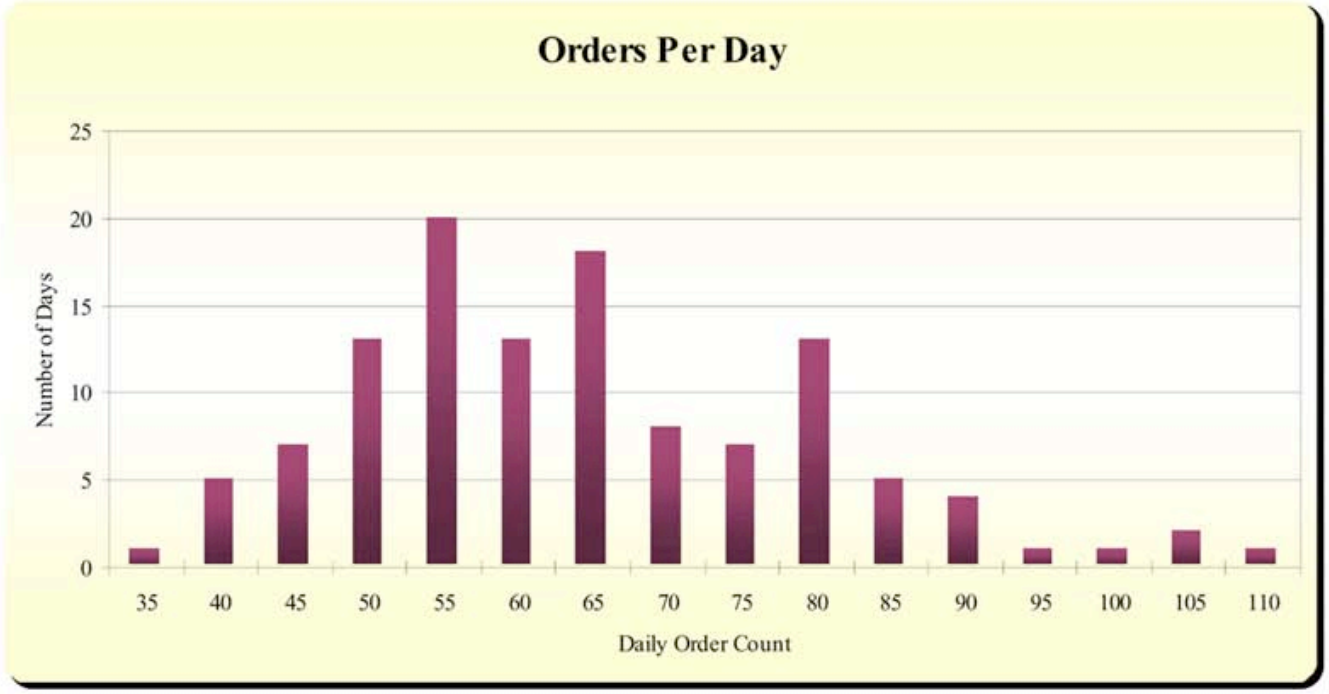
Orders per Day

The number of orders processed per day fluctuates, but it is most common to ship 55 to 65 orders per day.



# Orders Shipped/Day	Frequency of occurrence
35	0.84%
40	4.20%
45	5.88%
50	10.92%
55	16.81%
60	10.92%
65	15.13%
70	6.72%
75	5.88%
80	10.92%
85	4.20%
90	3.36%
95	0.84%
100	0.84%
105	1.68%
110	0.84%
Total	100.00%

Includes only 2002 activity.

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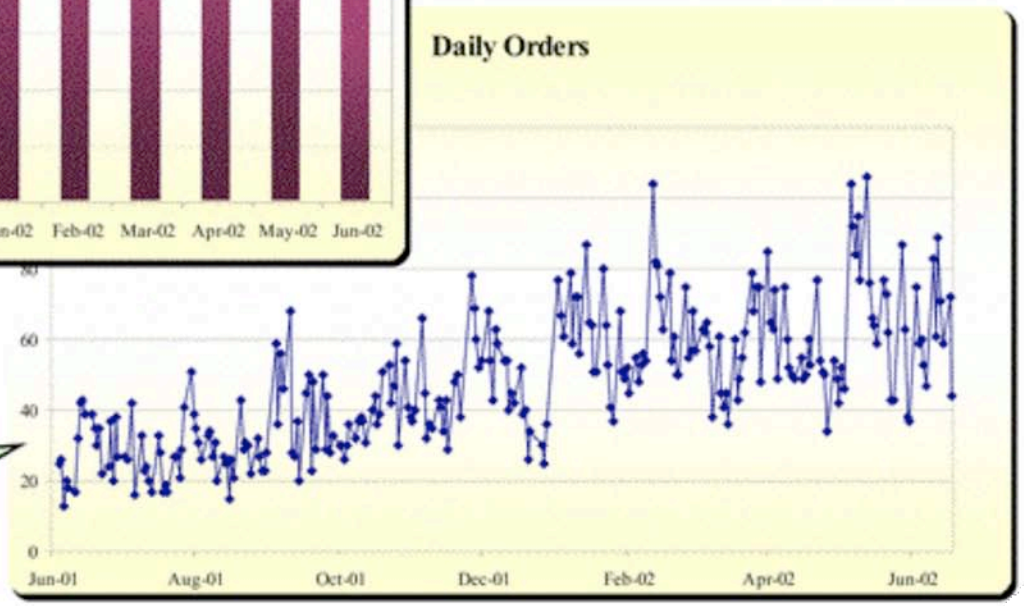
Shipment Volumes

January 2002 marked a step increase in shipment volumes.

Data files analyzed only contained partial shipment history for June 2002.



Shipment history after January 2002 most accurately reflects PDQ's current shipment rates.

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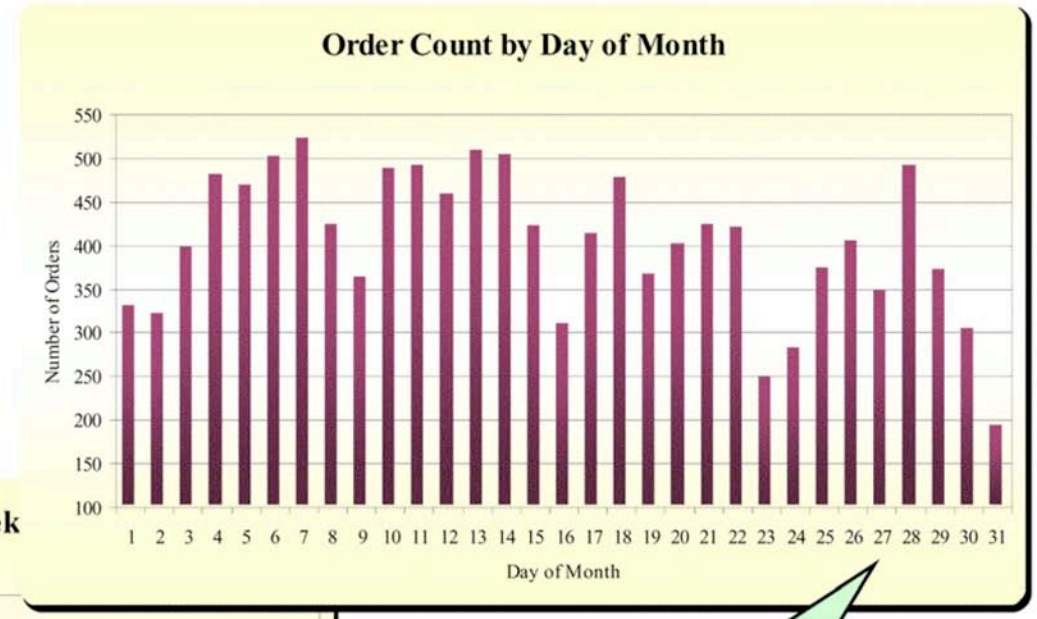
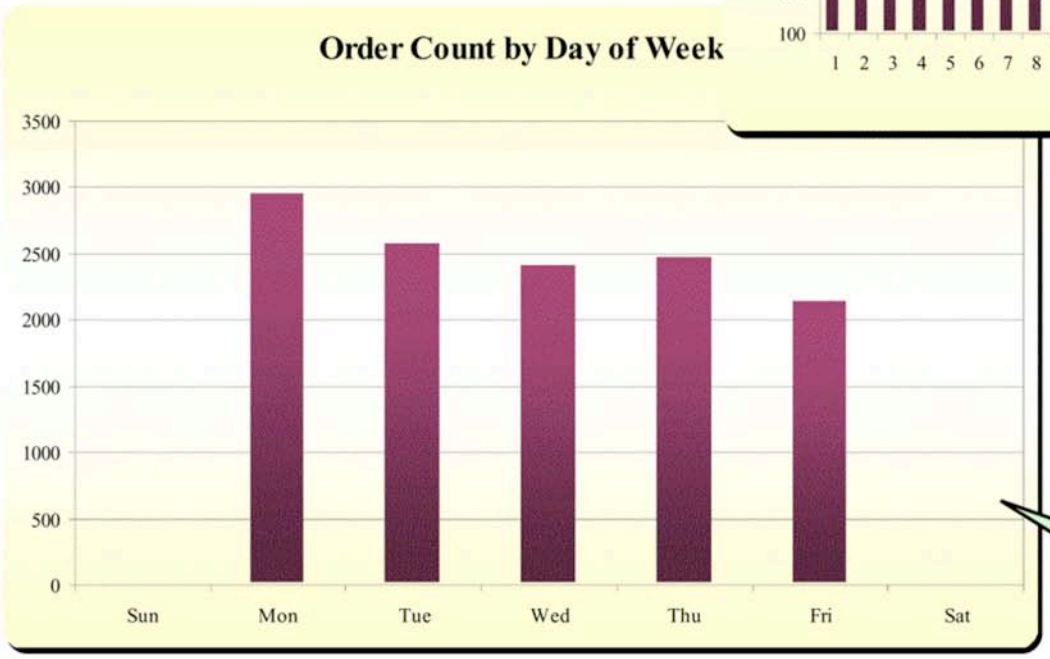
Activity Levels Per Day

Though total volumes have increased, the spread of daily orders has remained constant.





Shipment volumes tend to drop off toward the end of months.

Mondays seem to be the busiest day of the week.

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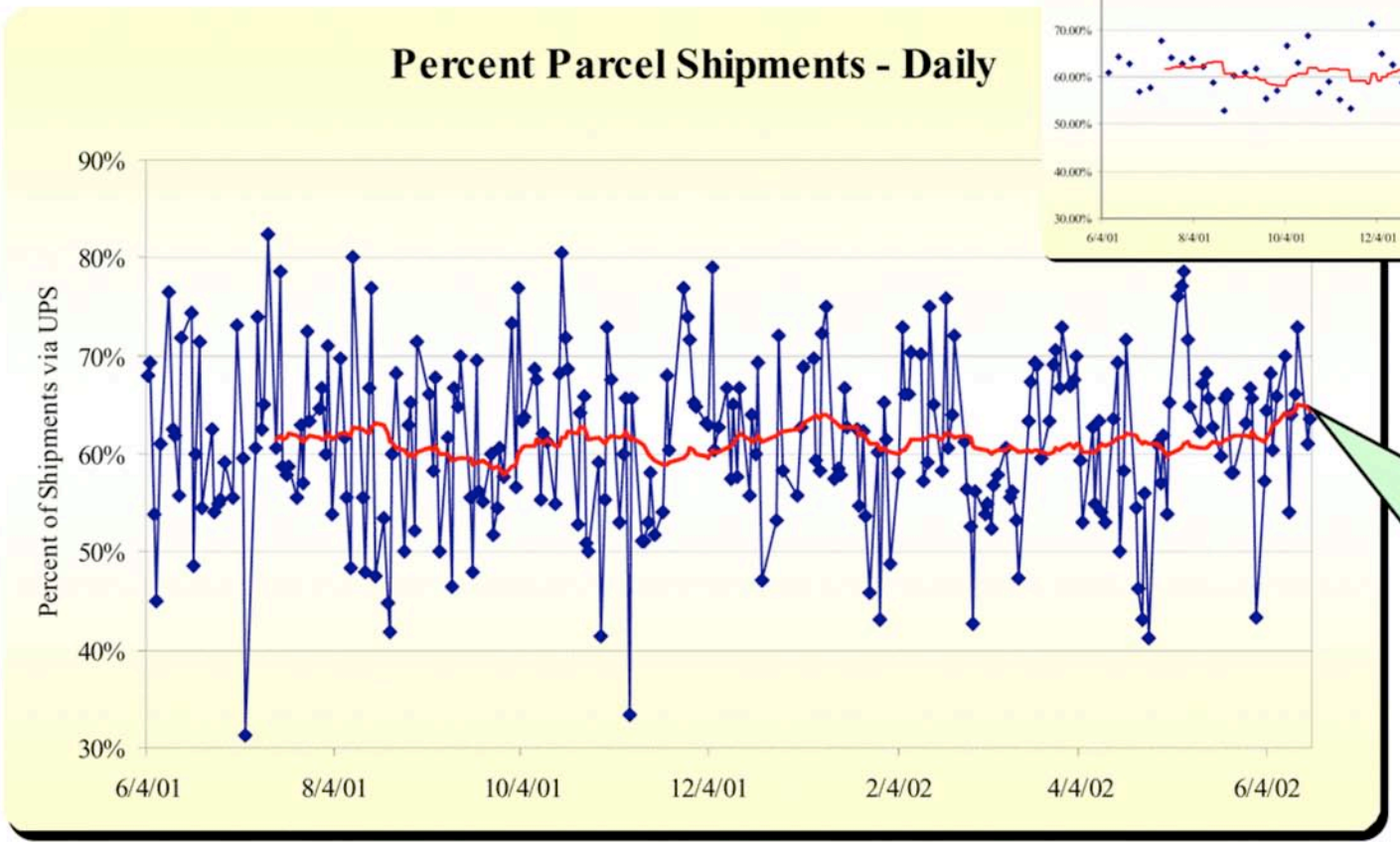
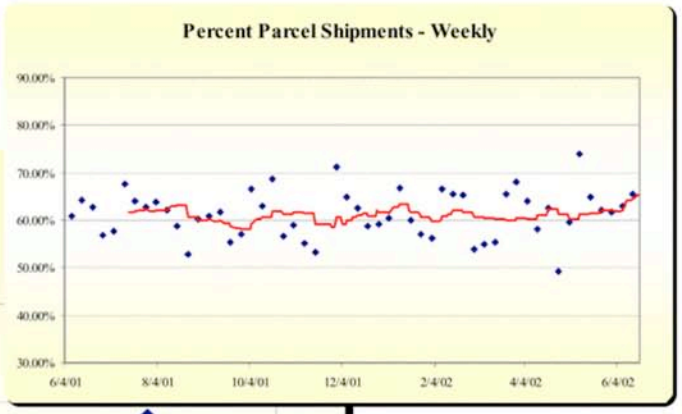
Shipment Mode

Parcel shipments constitute the majority of all shipments - more than 60%.





Though there is high daily variability, the trend line shows a stable ratio of parcel shipments over time.

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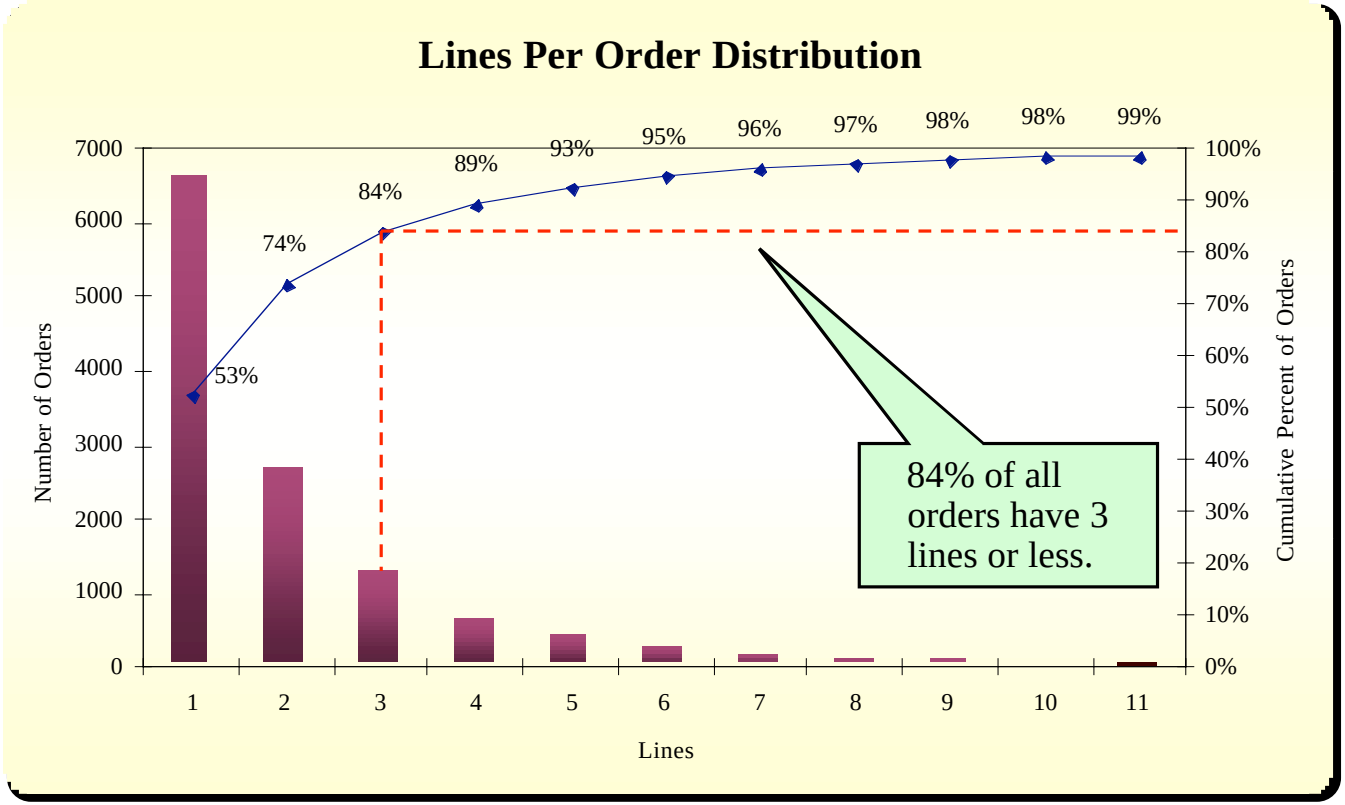
Lines Per Order Profile

More than 50% of all orders were a single line only. Order picking can be designed to leverage this for increased efficiency.



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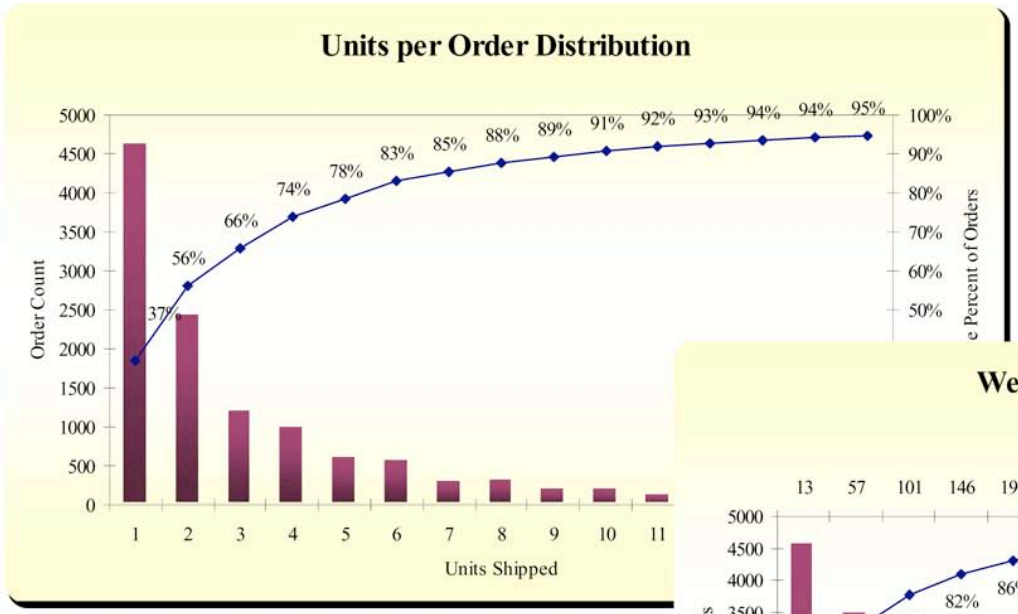
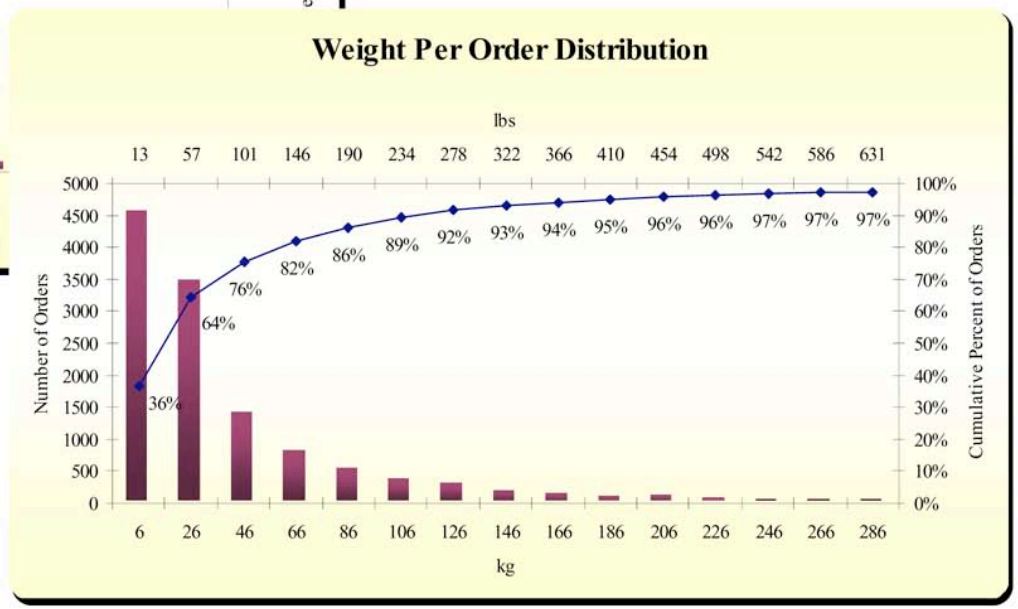
Units and Weight Per Order

Line, weight, and unit per order profiles can be examined to define the most suitable order fulfillment methodologies.





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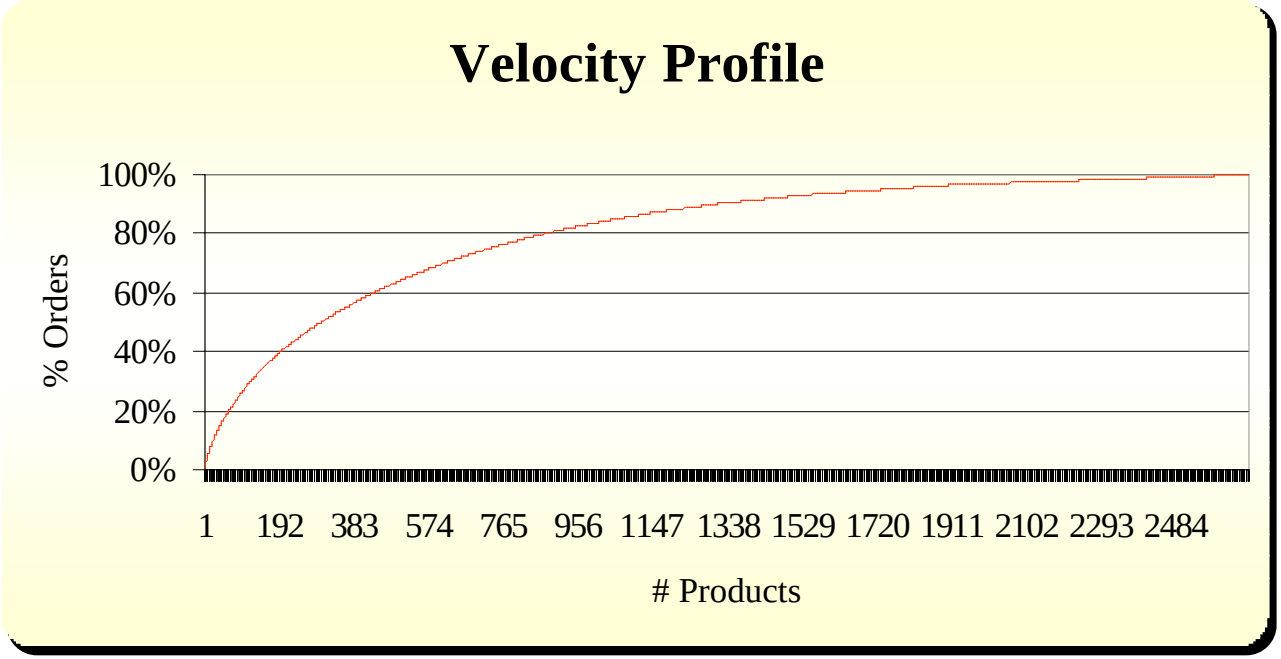
Product Movement Profile

Order activity was analyzed for each product to distinguish fastest moving items from the slower moving ones.



Product Movement	# SKU's	Picks	% SKU's	% Picks
Fastest Movers	869	17,712	33%	80%
Medium Movers	870	3,324	33%	15%
Slow Movers	930	1,109	35%	5%
Total	**2,669**	**22,145**	**100%**	**100%**

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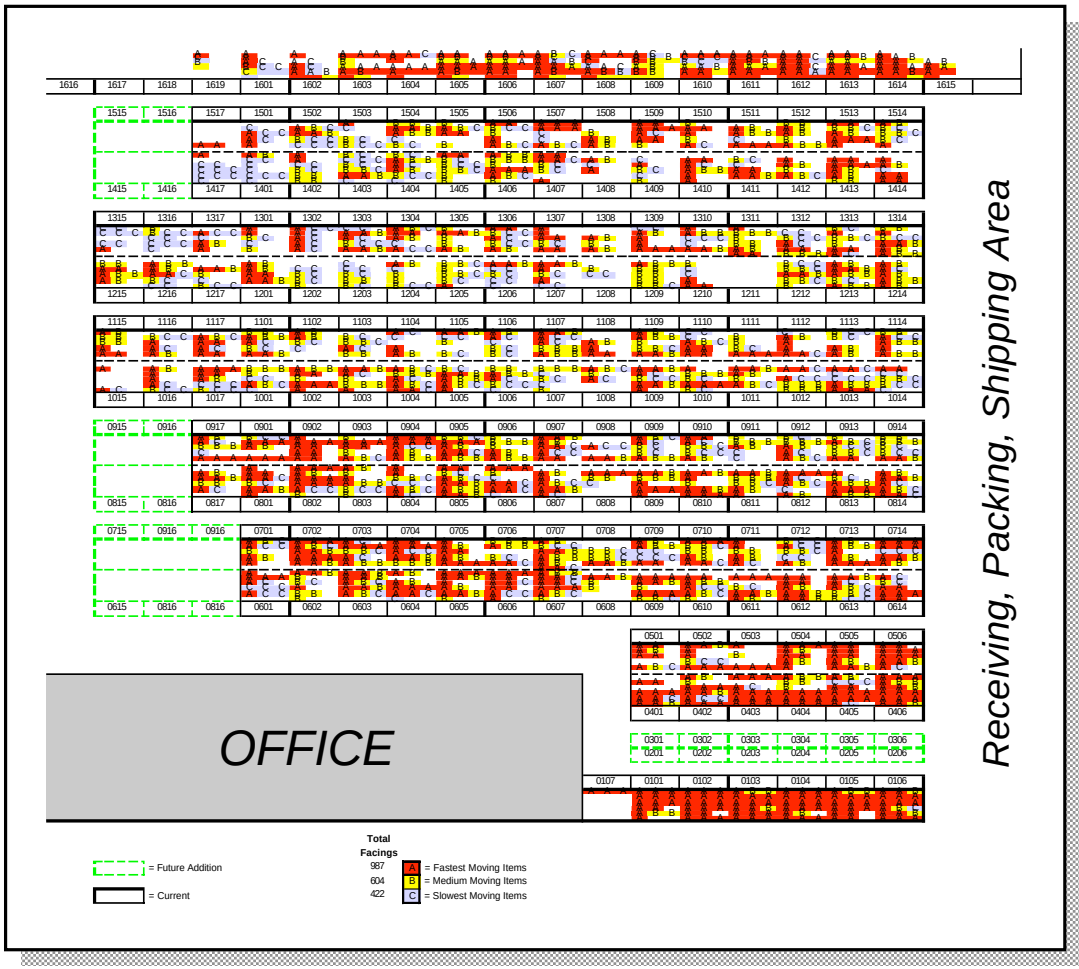
Product Movement Profile

Using the product velocity profile, Peach State was able to identify operational improvements PDQ should consider.

- An overview map of the warehouse was developed which shows where products are stored.
- Fastest moving items are shown in red, and are evenly distributed in the warehouse.
- A revised approach to product storage could decrease labor costs and shorten order cycle times.



Space and Process Improvements

Peach State recommended the following enhancements for the existing warehouse, based on a one day site assessment:

- ***Slotting*** -
  - Zone the warehouse by velocity—"A", fast moving items = front, "B" movers = middle, "C" & "Dogs" = back.
    - Keep fastest moving items toward the dock & on the floor; opportunity exists to re-slot the warehouse.
    - Putaway – store and putaway receipts of product by velocity zone; use first part of shift to replenish floor/forward slots from reserve.
  - Allocate the right amount of product to a forward location; i.e., don't tie up 3 floor slots with same product if slots would be better served with other, fast moving SKU's.
  - Continue to store items that ship together close to one another.
- ***Operations*** -
  - Adjust workstation layout for packing to minimize travel time between work table, terminal, printers & UPS manifest.
  - Evaluate increasing the size of the UPS waves to create more efficient picking tours; update system parameters as needed.
- ***Storage*** -
  - Rack out remaining floor space with selective pallet rack, minus space required for staging.
  - Creating deeper bays for longer products will only offer marginal space improvements.
  - Use dense storage for small cube items (e.g., more half pallet locations, bin shelving, &/or case rack).
  - Put mezzanine over shipping docks; returns or small cube items could be processed on mezzanine.
  - Rack out over dock doors to store packing materials and empty pallets.
  - Consolidate dead items on pallet, inventory, ID, and put in back of warehouse.
  - Possibly use floor storage for high cube, stackable items.

Detailed slotting will yield the greatest operational benefits to PDQ.

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Summary of Demand

The observations of the demand analysis were used to model PDQ's U.S. distribution network.

- For the purposes of the network study, we assume that customers behave the same no matter where they live in the U.S. The order size, order value, frequency, and return rates all follow the typical customer profile.
- The number of daily orders can fluctuate over a wide range. The distribution network must be flexible to allow for this variability.
- Sales have been steadily increasing in the U.S. and this trend should continue as PDQ enters new markets. The distribution network must be able to handle this future growth.
- Parcel shipments account for over 60% of the customer orders. This has been consistent over time, and is dependent on product type. PDQ must be equally capable of meeting service targets with both parcel and LTL shipments.
- More than half of the orders are for a single product only, and 80% of the volume is driven by the "fastest" one third of products. PDQ should examine its shipping operations to build in efficiency. For example, single line orders could be batch picked to reduce travel time. Even small improvements in order fulfillment methodology could yield significant results.

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Customer Locations

"Where are the largest markets?"

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Geographic Analysis of Demand

PDQ provided BPIA data which shows the population of office workers in the United States, divided into 3,109 counties.

- Office workers are PDQ's target customers.
- The data includes workers in large, small, and home offices.
- Alaska and Hawaii were excluded from the study: this was only 0.12% of the total population.

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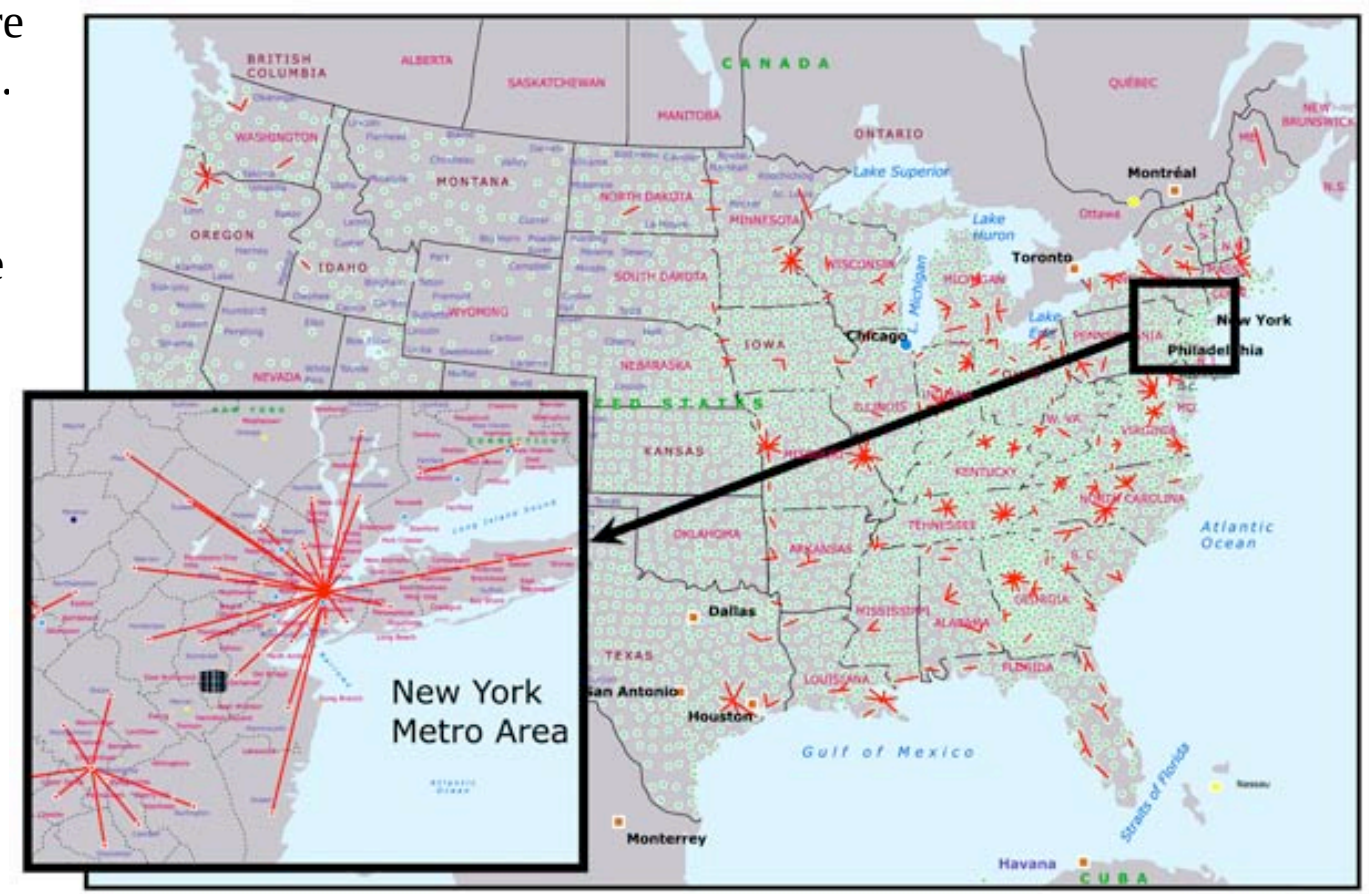
Demand Aggregation

To speed calculations, Peach State grouped demand into large metro areas made up of several counties.

- 302 Metro areas are defined by the U.S. Census Bureau.
- 86 percent of U.S. office workers live in these areas.
- Style conscious consumers tend to live in these metro areas also.
- Marketing can be easily focused on these dense areas.



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Analysis of Demand

The largest 50 metro areas are used in the network study. These areas represent 58 percent of U.S. office workers.

- The network model will focus on the largest cities first.
- This level of aggregation allows faster modeling results but does not affect validity.
- Final results will be reported using the full 3,109 county list and 100% of the population.

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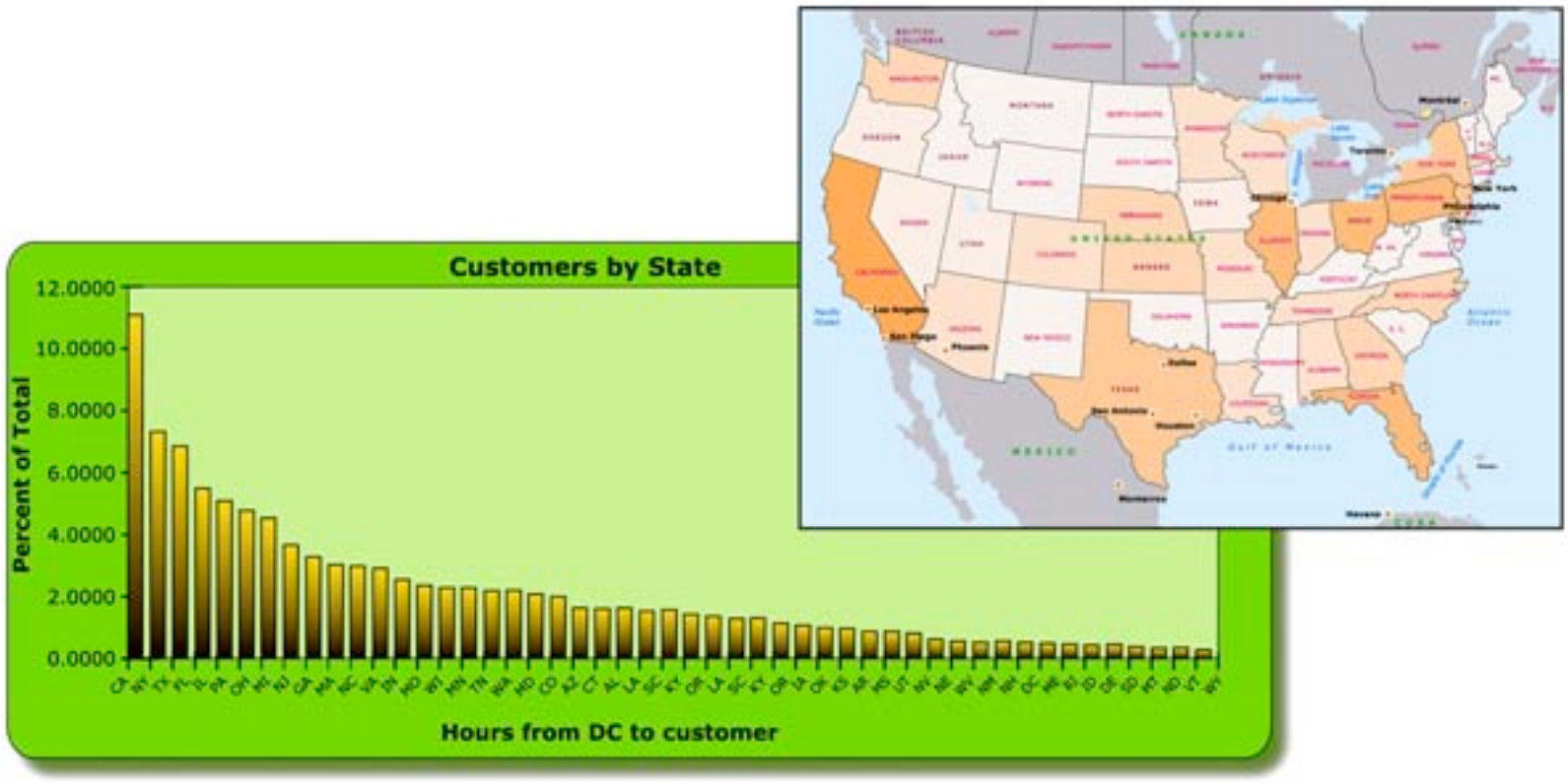
Analysis of Demand

Customer orders and returns should follow the same geographic distribution as the population of office workers in the U.S.

- California, New York, and Texas have the largest concentration of office workers.
- The central area of the U.S. is sparsely populated compared to the coasts.



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Network Model and Baseline

"What service can PDQ provide with its existing distribution center in central NJ?"

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Network Model

Peach State built a model of PDQ's network based on the following assumptions.

- The network model calculates actual road distances between distribution centers and customers.
- All customers are assigned to the closest DC.
- LTL shipments travel 500 miles per day on average.
- Parcel delivery times are based on UPS Ground service and are quoted in business days.
- The model locates each distribution center to minimize average distance to the customers.
- Return shipments follow the same pattern as outbound shipments. We assume there is a fixed percentage of all orders that will be returned.

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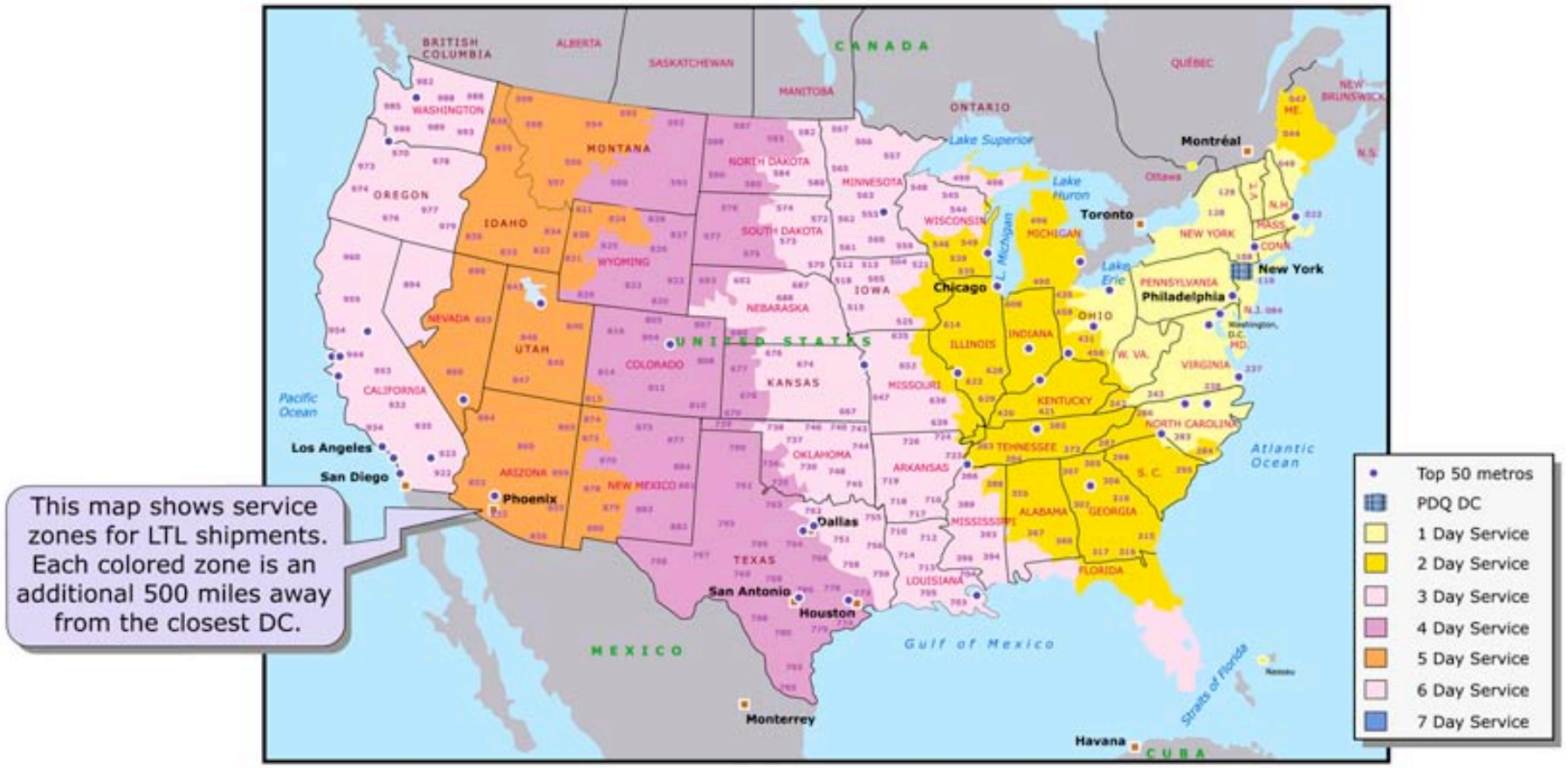
Baseline Network

With just one distribution center located in New Jersey, PDQ will not be able to meet its service targets nationwide.



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Baseline Network

The first scenario includes only the existing facility in central NJ. This scenario was used as the index to rate all other scenarios.

This map shows which areas of the country are served by each DC.

For each scenario, this table gives details for individual DC's.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cranbury, NJ	100%	1,116	3.0
Overall Network	100%	1,116	3.0

Statistics are shown here for the entire network.

LTL Efficiency Index: 100

The LTL efficiency index is proportional to total road mileage. **Lower numbers are more efficient.**

Parcel Efficiency Index: 100

The Parcel Efficiency Index is proportional to total parcel days in transit. **Lower numbers are more efficient.**

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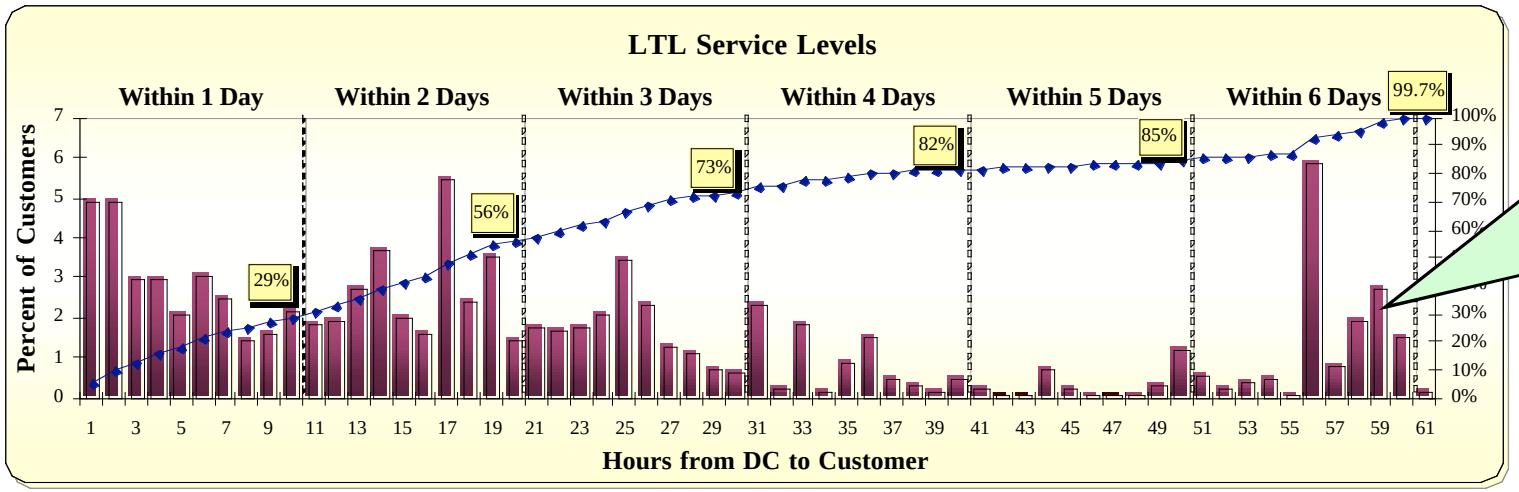
Baseline Network

PDQ uses both LTL and Parcel shipments. With the existing network, some customers can expect to wait a week for delivery.

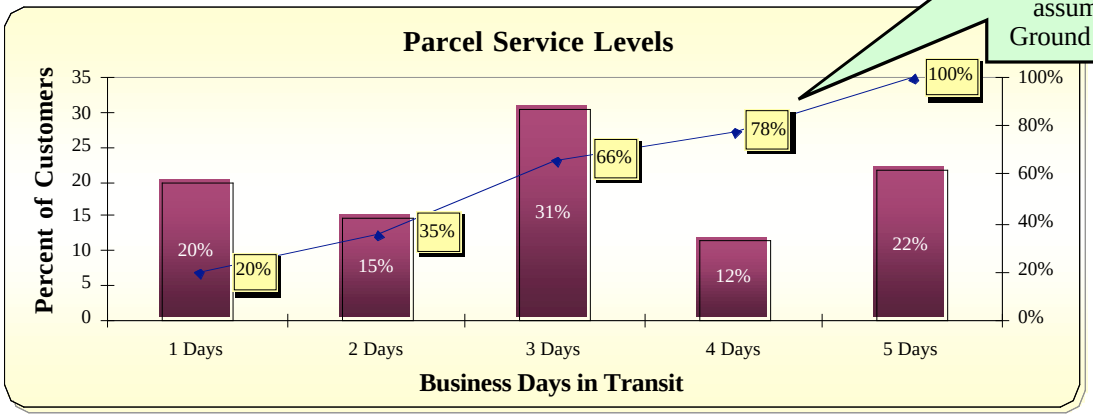


Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

This chart shows how long LTL shipments take to reach the customer. All calculations are based on 10 hours at 50 miles per hour, for 500 miles per day.

This chart shows how long Parcel shipments can take to reach the customer. The source data assumes UPS Ground shipment.

If PDQ starts marketing to the entire United States, only 29% of LTL volume and 20% of parcel volume will be within a one day service area from the existing facility.



Based on quoted duration of UPS Ground service.

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Scenario Evaluation

“How many distribution centers does PDQ need?”

“Where should they be located?”

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Scenario Overview

Several different scenarios were considered using the model. Each was compared to the baseline to rank its performance.

- **One day service nationwide:** How many distribution centers are needed to reach 100% of the United States in 24 hours?
- **Best 1 DC network:** If PDQ only has one DC, where should it be?
- **Best 2 DC network:** Where should 2 DC's be located? How is service improved?
- **Best network with Central NJ + 1 other DC:** If PDQ added one new DC to its existing facility, where should it be placed?
- **Best 3 DC network:** Where should 3 DC's be located? What are the additional benefits?
- **Best network with Central NJ + 2 other DCs:** In addition to the existing facility, where should two new DCs be located?

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Scenario: One Day Service

When 10 DCs are placed to minimize cost, one day service nationwide is still not possible.

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Scenario: One Day Service

Distribution centers are located near major metropolitan areas to reduce the overall cost of the network.

DC Location	Percent of Customers	Anerage Road Distance (miles)	Anerage Parcel Days in Transit
Manhattan, NY	23%	145	1.3
Richland, TX	10%	268	1.4
Avon Park, FL	5%	139	1.0
Stone Park, IL	17%	247	1.4
Cleveland, OH	11%	171	1.1
Los Angeles, CA	9%	133	1.3
Snoqualmie, WA	3%	188	1.1
San Ramon, CA	5%	92	1.0
Golden, CO	4%	343	1.6
Cumming, GA	13%	249	1.6
Overall Network	100%	196	1.3

LTL Efficiency Index: 19
Parcel Efficiency Index: 44

Many of these locations would be appropriate for local showrooms if PDQ wanted to have a presence in key markets.

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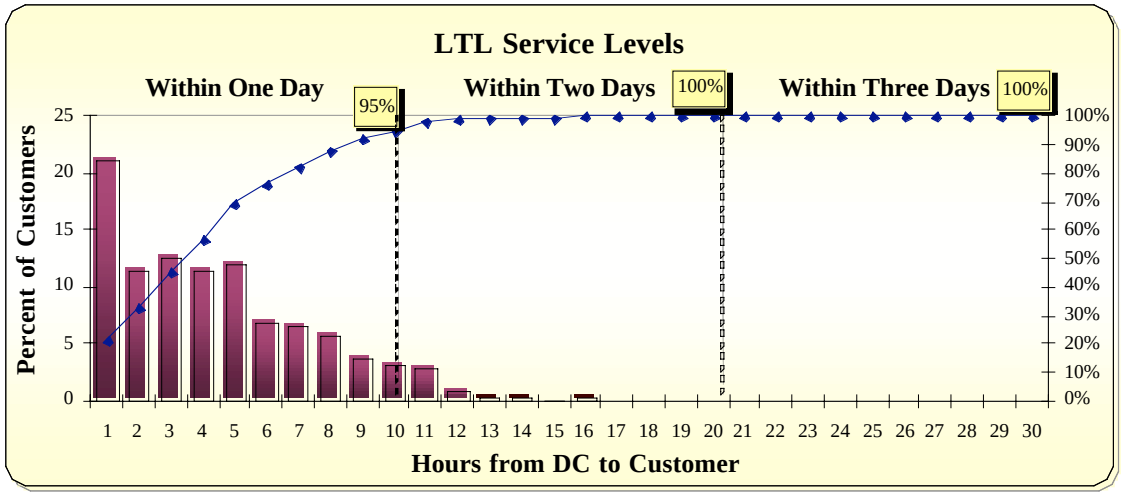
Scenario: One Day Service

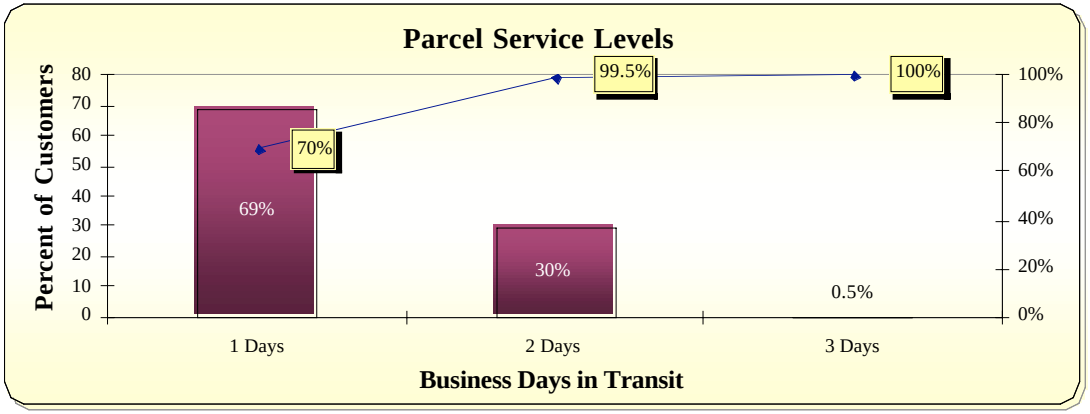
With 10 facilities nationwide, service levels would be very high. The operating costs would also be extremely high.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

Most of the country receives 1 day service. Large geographic areas of the country receive 2 day service, but the number of customers in these areas is very small.

Most parcel shipments will reach customers in one business day.



Based on quoted duration of UPS Ground service.

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Scenario: Best 1 DC

Because most of the population lives in the eastern half of the country, a single facility would be located centrally.

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Scenario: Best 1 DC

Distribution activities are roughly 16-20% more efficient than the baseline scenario. This location was chosen to reduce the total network cost, but some customers will have slower service.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cincinnati, OH	100%	894	2.5
Ocverall Network	100%	894	2.5

LTL Efficiency Index: 80
Parcel Efficiency Index: 84

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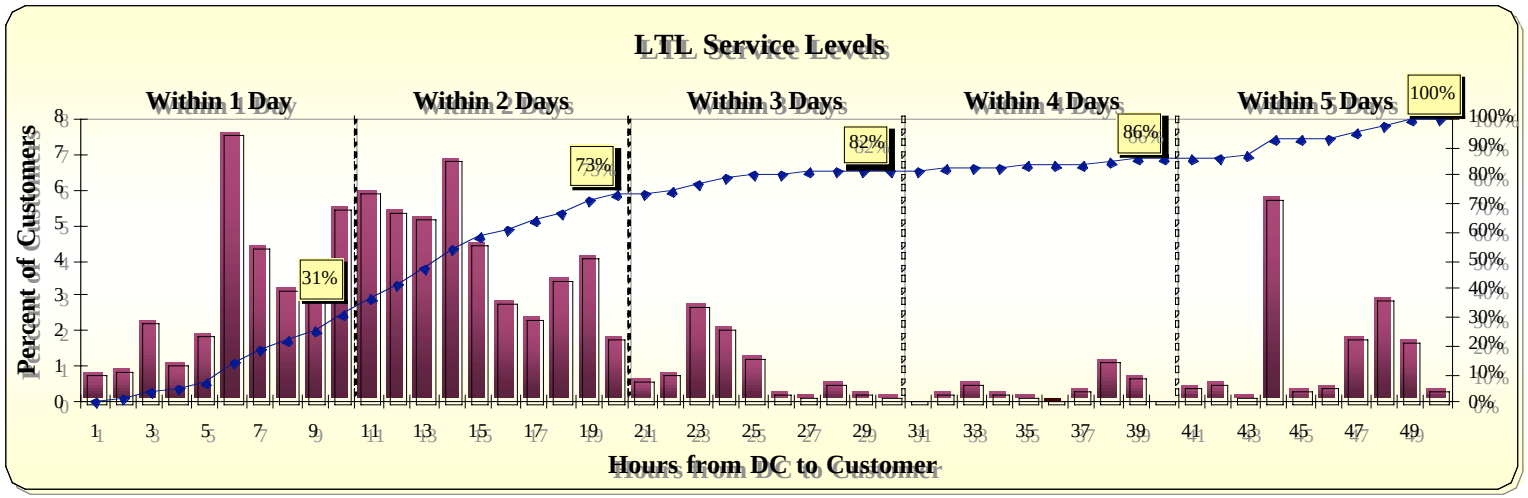
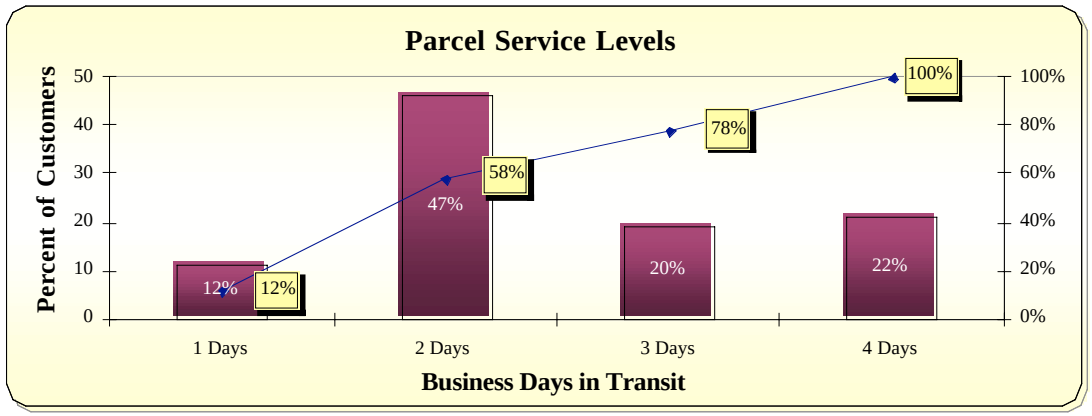
Scenario: Best 1 DC

This scenario cannot reach either of the largest markets in one day, but achieves higher overall service than the baseline.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

The UPS parcel network usually follows the same behavior as the LTL road network.



Based on quoted duration of UPS Ground service.

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Scenario: Best 2 DCs

By adding a second DC, the network is able to serve both coasts with one day service, and reach most of the country within 3 days.

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Scenario: Best 2 DCs

Distribution activities are more efficient than with a single DC. Based on customer percentages, the eastern facility is much larger than the second center.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Fairmont, WV	78%	602	2.3
Pearblossom, CA	22%	572	2.1
Ocverall Network	100%	595	2.3

LTL Efficiency Index: 55
Parcel Efficiency Index: 77

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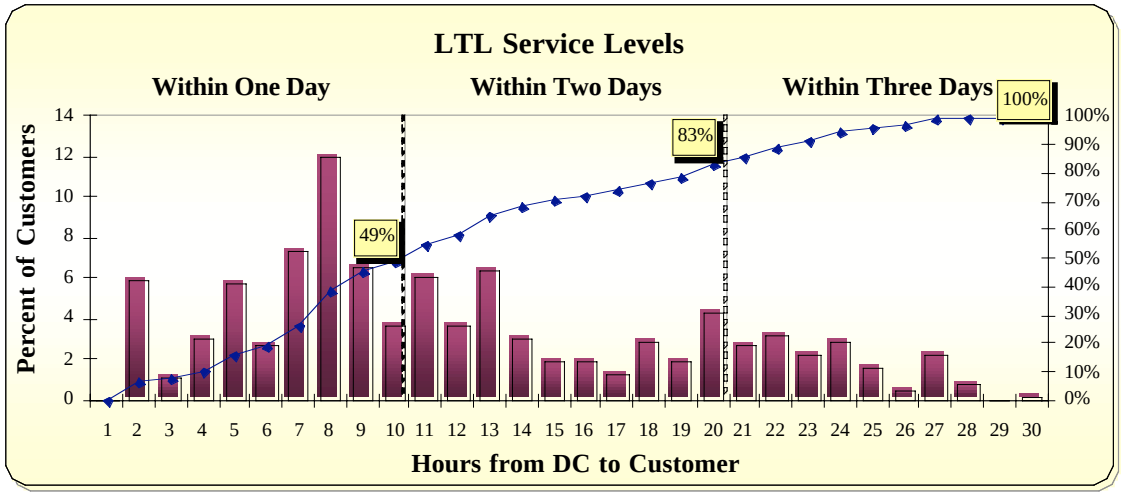
Scenario: Best 2 DCs

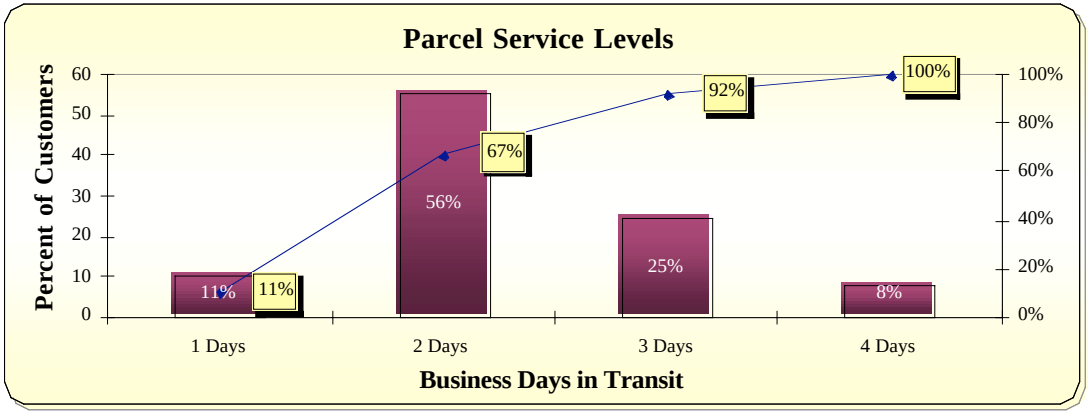
Virtually all of the country can be reached in 3 days from the two locations in this scenario.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

Although there is a small area of southern Texas that receives 4 day service, the population there is minimal.

92% of the nation would receive a parcel shipment within 3 business days.



Based on quoted duration of UPS Ground service.

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Scenario: Central NJ + 1 DC

Adding a second DC to the current network has very similar results compared with the "Best 2 DC" scenario.

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Scenario: Central NJ + 1 DC

The existing site is not the optimal location for a DC, but the efficiency of the network is not reduced significantly. Relocating the original DC should be done only if other needs arise.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cranbury, NJ	72%	639	2.3
Edwards, CA	27%	739	2.5
Ocverall Network	100%	667	2.4

LTL Efficiency Index: 61
Parcel Efficiency Index: 79

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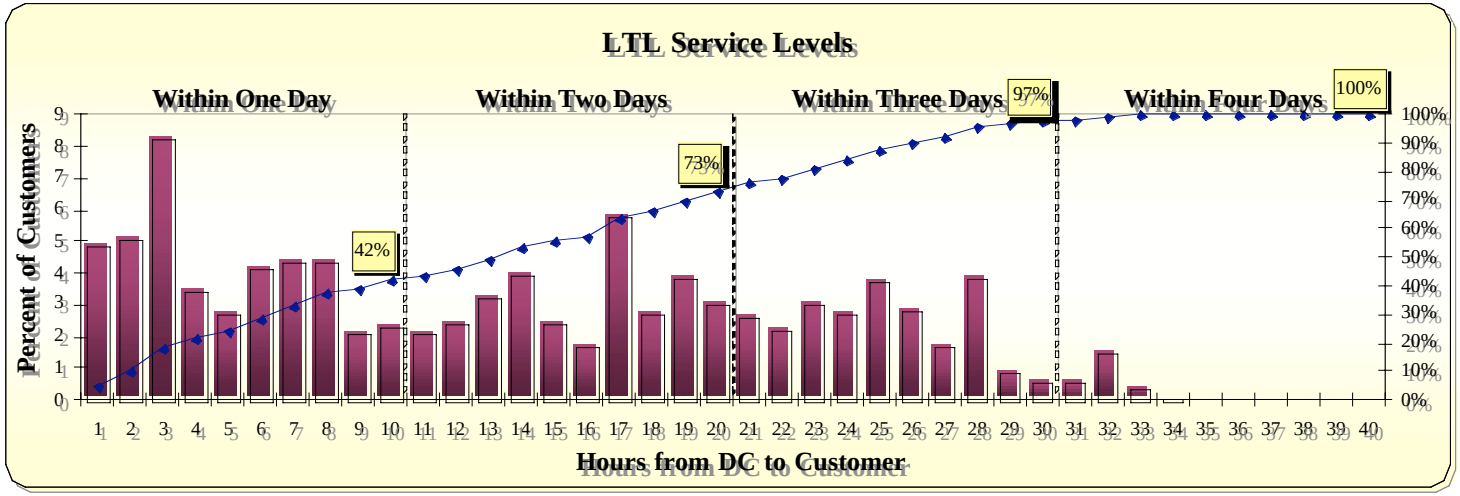
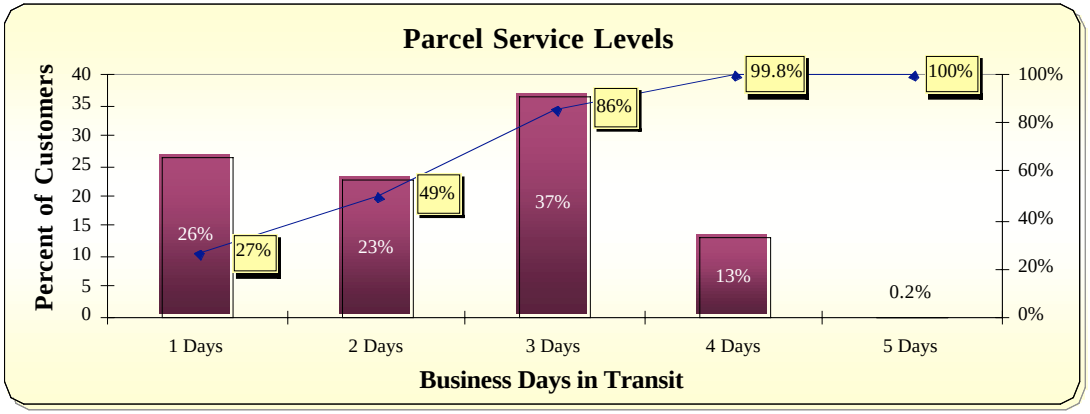
Scenario: Central NJ + 1 DC

A small section (3%) of the country receives only 4 day service in this scenario. Houston is the only metro area in this region.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

Overall, service is only slightly lower than the scenario with the Best 2 DC network.



Based on quoted duration of UPS Ground service.

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Scenario: Best 3 DCs

Adding a third DC brings the national service level even higher.

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Scenario: Best 3 DCs

This may be a good long term plan for growing PDQ's distribution network. A more detailed second study could identify the expected costs of this scenario.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Enfield, IL	50%	562	2.1
Jersey City, NJ	31%	222	1.4
Palmdale, CA	19%	451	1.9
Ocverall Network	100%	436	1.9

LTL Efficiency Index: 41
Parcel Efficiency Index: 62

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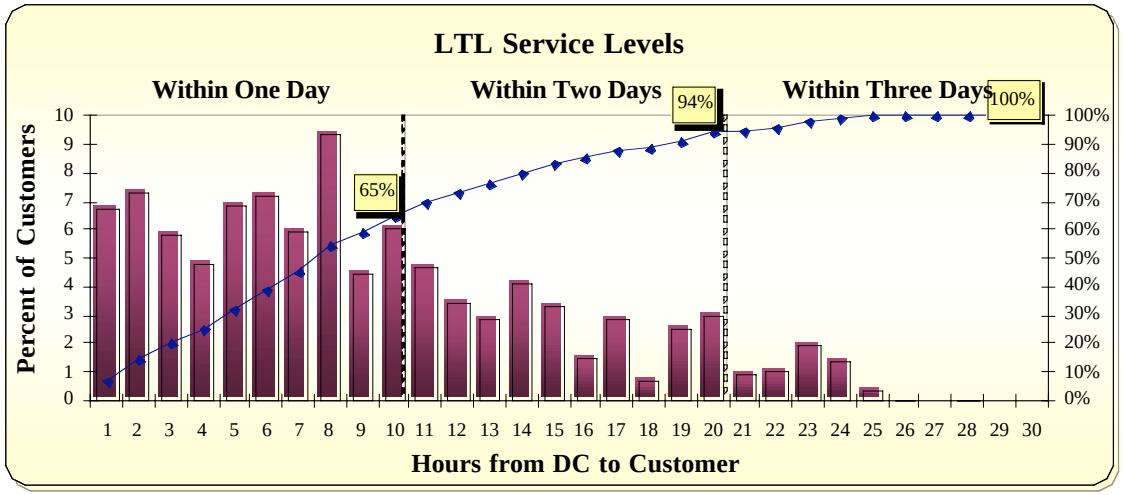
Scenario: Best 3 DCs

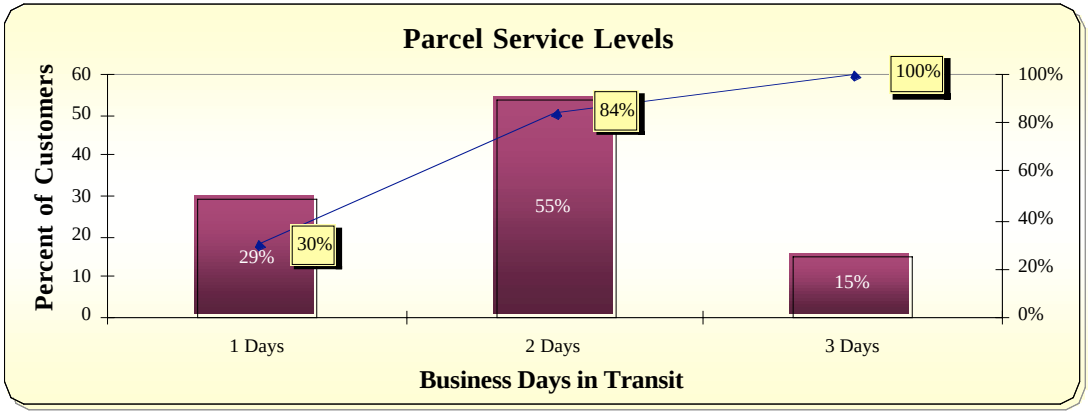
Most of the nation could receive 2 day service with a 3 DC network. Shipments can reach the largest markets in only 1 day.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

Of the 50 largest U.S. metro areas only Seattle, Miami, and Fort Lauderdale would not receive at least 2 day service.

All customers could receive parcel shipments within 3 business days.



Based on quoted duration of UPS Ground service.

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Scenario: Central NJ + 2 DCs

This scenario is almost identical to the "Best 3 DC" scenario since the existing DC is within 50 miles of the optimal location.

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Scenario: Central NJ + 2 DCs

The performance of this scenario is statistically identical to the "Best 3 DC" solution.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cranbury, NJ	30%	214	1.3
Lancaster, CA	20%	475	1.9
Henderson, KY	50%	557	2.0
Ocverall Network	100%	439	1.8

LTL Efficiency Index: 41
Parcel Efficiency Index: 59

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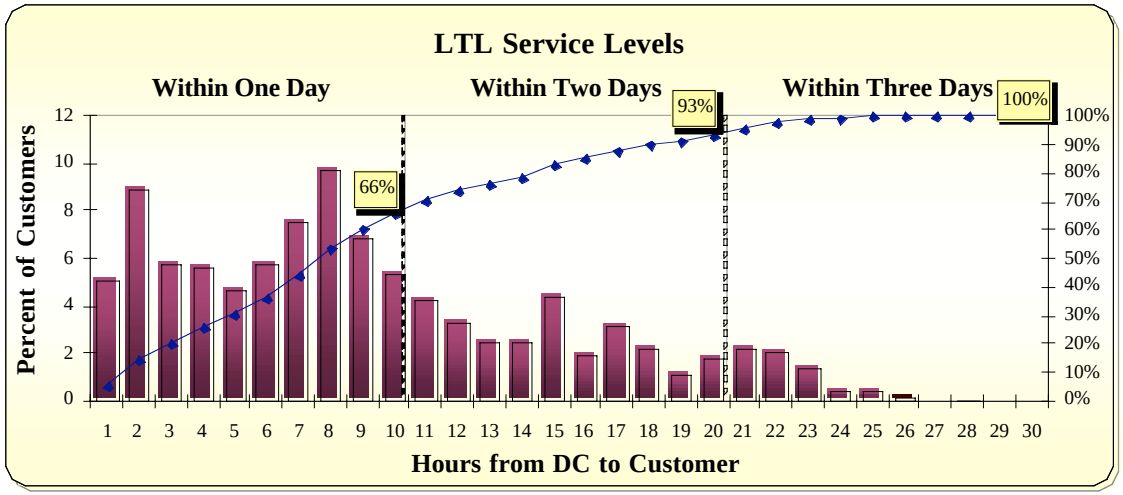
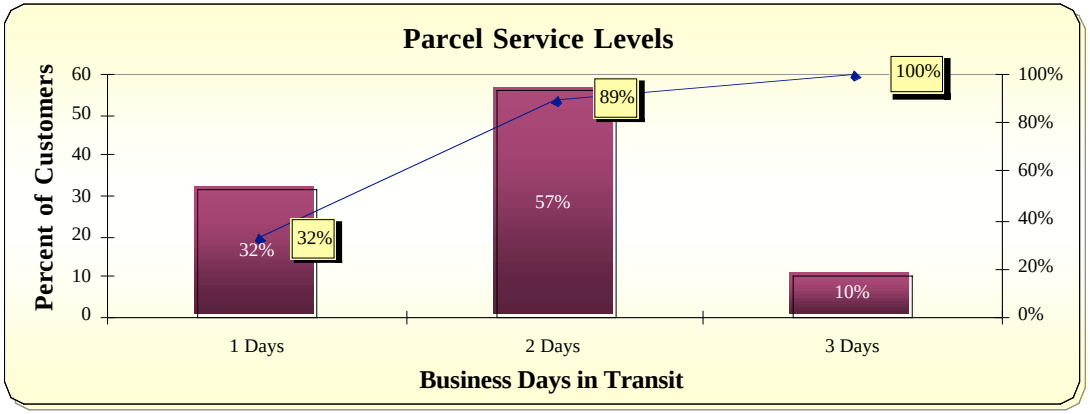
Scenario: Central NJ + 2 DCs

Again, this solution provides the the same service as the "Best 3 DC" scenario.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

The 2 day service level is only 1% less than the previous scenario.



Based on quoted duration of UPS Ground service.

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Summary and Recommendation

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Scenario Summary - LTL

This chart shows the performance of the LTL distribution network under each scenario in the study.

These scenarios are located in the appendix

Scenario	Baseline (Cranbury)	1 Day Service	Best 1 DC	Best 2 DCs	Cranbury + 1 DC	Best 3 DCs	Cranbury + 2 DCs	Cranbury & Reno	Cranbury & Las Vegas
Number of DCs	1	10	1	2	2	3	3	2	2
	LTL Service Levels								
1 Day	29%	95%	31%	49%	42%	65%	66%	35%	39%
2 Days	56%	100%	73%	83%	73%	94%	93%	74%	73%
3 Days	73%	-	82%	100%	97%	100%	100%	94%	100%
4 Days	82%	-	86%	-	100%	-	-	100%	-
5 Days	85%	-	100%	-	-	-	-	-	-
6 Days	99.7%	-	-	-	-	-	-	-	-
7 Days	100%	-	-	-	-	-	-	-	-
	LTL Shipments								
Average miles from DC to Customer	1,116	196	894	595	667	436	439	698	667
LTL Efficiency Index	100	19	80	55	61	41	41	64	61

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Scenario Summary - Parcel

This chart shows the performance of the parcel distribution network under each scenario in the study.

Scenario	Baseline (Cranbury)	1 Day Service	Best 1 DC	Best 2 DCs	Cranbury + 1 DC	Best 3 DCs	Cranbury + 2 DCs	Cranbury & Reno	Cranbury & Las Vegas
								These scenarios are located in the appendix	
Number of DCs	1	10	1	2	2	3	3	2	2
	Parcel Service Levels								
1 Day	20%	70%	12%	11%	27%	30%	32%	22%	21%
2 Days	35%	99.5%	58%	67%	49%	84%	89%	51%	50%
3 Days	66%	100%	78%	92%	86%	100%	100%	86%	86%
4 Days	78%	-	100%	100%	99.8%	-	-	97%	100%
5 Days	100%	-	-	-	100%	-	-	100%	-
	Parcel Shipments								
Average Parcel Days in Transit	3.0	1.3	2.5	2.3	2.4	1.9	1.8	2.3	2.4
Parcel Efficiency Index	100	44	84	77	79	62	59	78	81

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Recommendations

Peach State recommends the following implementation plan for PDQ during their period of growth in the U.S. market.

- **Existing Facilities:** The existing facility was placed in an important strategic location. It is not necessary to relocate this facility to increase customer service. However, relocation may be necessary for operational reasons, such as outgrowing the current facility.
- **New Facilities:** Adding a second distribution center near Los Angeles would achieve three day service levels for 97% of the target customers. Based on the population, shipments from this facility would only represent 25-30% of total U.S. sales volume.
- **Additional Expansion:** If higher service levels are required or if sales volumes increase, a third facility could be added to the network. With a third facility, PDQ could provide 2 day service to 93% of the country.
- **Detailed Cost Analysis:** A more in depth study would provide a view of PDQ's actual distribution costs. This analysis should consider the transportation, inventory, and operating costs of PDQ's distribution network. PDQ should consider all relevant costs to determine whether a new facility can be justified economically.
- **Inbound Shipments:** Without actual cost data, it is not possible to identify the best ports to bring products into the U.S. Peach State can provide a framework for these decision for PDQ to use in the future.

Appendix

- Scenario: Central NJ & Reno
- Scneario: Central NJ & Las Vegas
- BPIA Data: 50 Top Metro Areas

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Scenario: Central NJ & Reno

Instead of placing a second DC in California, PDQ could locate in Reno, NV to share space with its sister company.

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Scenario: Central NJ & Reno

This network is less efficient than other scenarios with 2 distribution centers. However, it is still a significant improvement over the baseline network.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cranbury, NJ	79%	715	2.5
Reno, NV	21%	637	1.7
Ocverall Network	100%	698	2.3

LTL Efficiency Index: 64
Parcel Efficiency Index: 78

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Scenario: Central NJ & Las Vegas

Based on distribution alone, Las Vegas is not the best city for a second DC. However, other factors may outweigh transportation.

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Scenario: Central NJ & Las Vegas

PDQ's facility costs may be less expensive in Las Vegas than in the Los Angeles area. Residents of California would not have to pay sale tax, possibly providin an increase in sales.

DC Location	Percent of Customers	Average Road Distance (miles)	Average Parcel Days in Transit
Cranbury, NJ	71%	624	2.3
Las Vegas, NV	29%	773	2.7
Ocverall Network	100%	667	2.4

LTL Efficiency Index: 61
Parcel Efficiency Index: 81

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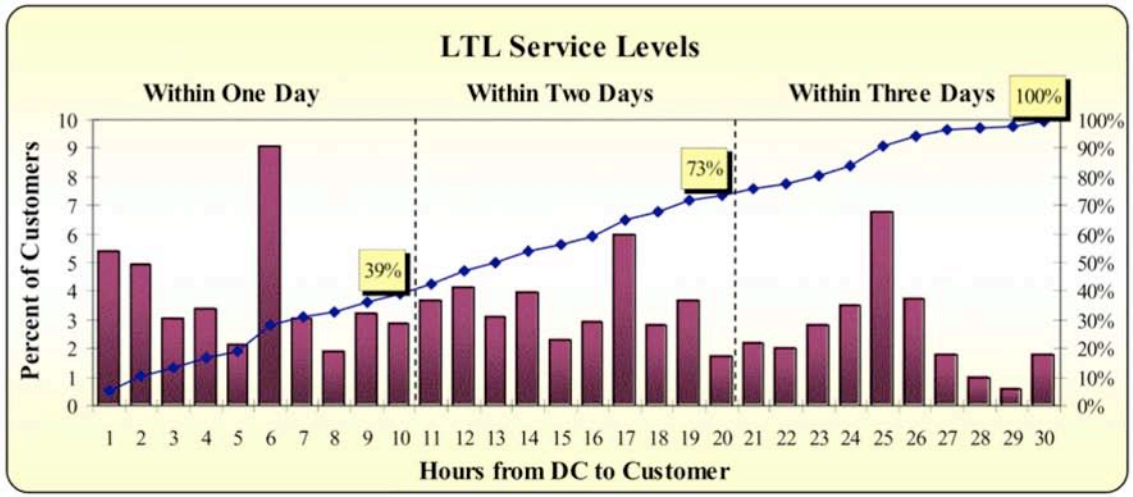
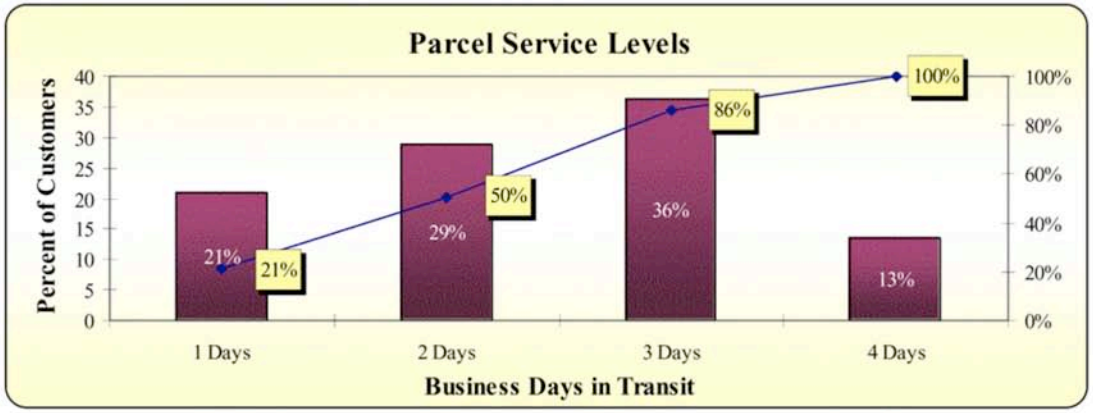
Scenario: Central NJ & Las Vegas

Service levels in this scenario are similar to other options.



Drivers travel 500 miles per day, based on a 10 hour shift at 50 mph.

Los Angeles is just 275 miles from Las Vegas, and could receive LTL shipments in one day. UPS would guarantee a parcel shipment within 2 business days.



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BPIA Data: Top 50 Metro Areas

Peach State used the top 50 metro areas to design the U.S. network.

Rank by Size	% US Office Workers (Sales Volume)	Cumulative Percent of U.S. Population	Metro Area	Central City	State	Zip Code	Closest DC	Miles to DC	Est. LTL Travel Time (Days)	Parcel Days in Transit	U.S. Population Served by Cranbury	U.S. Population Served by West Coast DC
1	7.419	7.4%	New York-Newark, NY-NJ-PA PMA	Manhattan	NY	10044	Cranbury, NJ	52	0.1	1	7.4%	0.0%
2	3.604	11.0%	Chicago, IL PMA	Stone Park	IL	60165	Cranbury, NJ	821	1.6	3	11.0%	0.0%
3	3.538	14.6%	Los Angeles-Long Beach, CA PMA	Los Angeles	CA	90062	West Coast DC	108	0.2	5	11.0%	3.5%
4	2.808	17.4%	Boston-Brockton- Nashua, MA-NH-NECMA	Waltham	MA	02451	Cranbury, NJ	255	0.5	1	13.8%	3.5%
5	2.081	19.5%	Philadelphia, PA-NJ PMA	Philadelphia	PA	19128	Cranbury, NJ	55	0.1	1	15.9%	3.5%
6	2.015	21.5%	Washington, DC-MD-VA-WV PMA	McLean	VA	22101	Cranbury, NJ	198	0.4	2	17.9%	3.5%
7	1.798	23.3%	Detroit, MI PMA	Franklin	MI	48025	Cranbury, NJ	644	1.3	3	19.7%	3.5%
8	1.756	25.0%	Atlanta, GA MA	Atlanta	GA	30324	Cranbury, NJ	825	1.7	3	21.5%	3.5%
9	1.603	26.6%	Dallas, TX PMA	Dallas	TX	75214	West Coast DC	1,382	2.8	4	21.5%	5.1%
10	1.549	28.2%	Houston, TX PMA	Houston	TX	77076	West Coast DC	1,594	3.2	5	21.5%	6.7%
11	1.458	29.6%	Minneapolis-St. Paul, MN-WI MA	Minneapolis	MN	55422	Cranbury, NJ	1,226	2.5	3	22.9%	6.7%
12	1.165	30.8%	Orange County, CA PMA	Irvine	CA	92618	West Coast DC	138	0.3	5	22.9%	7.9%
13	1.132	31.9%	St. Louis, MO-IL MA	St Louis	MO	63117	Cranbury, NJ	940	1.9	3	24.1%	7.9%
14	1.116	33.0%	Phoenix-Mesa, AZ MA	Buckeye	AZ	85326	West Coast DC	396	0.8	5	24.1%	9.0%
15	1.044	34.1%	Seattle-Bellevue-Everett, WA PMA	Fall City	WA	98024	West Coast DC	1,144	2.3	5	24.1%	10.0%
16	0.988	35.1%	Cleveland-Lorain-Elyria, OH PMA	Cleveland	OH	44105	Cranbury, NJ	470	0.9	2	25.1%	10.0%
17	0.983	36.1%	Pittsburgh, PA MA	Pittsburgh	PA	15232	Cranbury, NJ	344	0.7	2	26.0%	10.0%
18	0.961	37.0%	San Francisco, CA PMA	Daly City	CA	94014	West Coast DC	373	0.7	5	26.0%	11.0%
19	0.955	38.0%	Baltimore, MD PMA	Baltimore	MD	21217	Cranbury, NJ	148	0.3	1	27.0%	11.0%
20	0.918	38.9%	Tampa-St. Petersburg-Clearwater, FL MA	Tampa	FL	33609	Cranbury, NJ	1,100	2.2	3	27.9%	11.0%
21	0.892	39.8%	Denver, CO PMA	Aurora	CO	80018	West Coast DC	979	2.0	4	27.9%	11.9%
22	0.872	40.7%	San Diego, CA MA	Ramona	CA	92065	West Coast DC	284	0.6	5	27.9%	12.7%
23	0.846	41.5%	Miami, FL PMA	Miami	FL	33187	Cranbury, NJ	1,282	2.6	3	28.8%	12.7%
24	0.816	42.3%	Oakland, CA PMA	San Ramon	CA	94583	West Coast DC	335	0.7	5	28.8%	13.6%
25	0.804	43.1%	San Jose, CA PMA	San Jose	CA	95138	West Coast DC	316	0.6	5	28.8%	14.4%

Distances, travel times, and DC assignments are from the "Central NJ + 1 DC" scenario.

Indicates metro areas that would be assigned to a DC on the West Coast under most scenarios.

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BPIA Data: Top 50 Metro Areas

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Rank by Size	% US Office Workers (Sales Volume)	Cumulative Percent of U.S. Population	Metro Area	Central City	State	Zip Code	Closest DC	Miles to DC	Est. LTL Travel Time (Days)	Parcel Days in Transit	U.S. Population Served by Cranbury	U.S. Population Served by West Coast DC
26	0.775	43.9%	Kansas City, MO-KS MA	Kansas City	MO	64130	Cranbury, NJ	1,171	2.3	4	29.5%	14.4%
27	0.758	44.7%	Portland-Vancouver, OR-WA PMA	Portland	OR	97220	West Coast DC	957	1.9	5	29.5%	15.1%
28	0.743	45.4%	New Haven-Bridgeport-Stamford-Danbury-Waterbury, CT NECMA	Shelton	CT	06484	Cranbury, NJ	114	0.2	1	30.3%	15.1%
29	0.740	46.1%	Milwaukee-Waukesha, WI PMA	Milwaukee	WI	53226	Cranbury, NJ	908	1.8	3	31.0%	15.1%
30	0.733	46.9%	Cincinnati, OH-KY-IN PMA	Cincinnati	OH	45217	Cranbury, NJ	616	1.2	2	31.8%	15.1%
31	0.699	47.6%	Indianapolis, IN MA	Indianapolis	IN	46218	Cranbury, NJ	683	1.4	3	32.5%	15.1%
32	0.686	48.3%	Columbus, OH MA	Columbus	OH	43203	Cranbury, NJ	512	1.0	2	33.1%	15.1%
33	0.677	48.9%	Orlando, FL MA	Orlando	FL	32807	Cranbury, NJ	1,044	2.1	3	33.8%	15.1%
34	0.668	49.6%	Charlotte-Gastonia- Rock Hill, NC-SC MA	Charlotte	NC	28216	Cranbury, NJ	589	1.2	2	34.5%	15.1%
35	0.647	50.2%	Riverside-San Bernardino, CA PMA	Ludlow	CA	92338	West Coast DC	224	0.4	5	34.5%	15.8%
36	0.573	50.8%	Nashville, TN MA	Nashville	TN	37210	Cranbury, NJ	848	1.7	3	35.1%	15.8%
37	0.565	51.4%	Fort Lauderdale, FL PMA	Weston	FL	33327	Cranbury, NJ	1,248	2.5	3	35.6%	15.8%
38	0.556	51.9%	Fort Worth-Arlington, TX PMA	Fort Worth	TX	76102	West Coast DC	1,353	2.7	4	35.6%	16.3%
39	0.551	52.5%	Hartford, CT NECMA	Hartford	CT	06105	Cranbury, NJ	164	0.3	1	36.2%	16.3%
40	0.539	53.0%	San Antonio, TX MA	San Antonio	TX	78212	West Coast DC	1,392	2.8	5	36.2%	16.9%
41	0.534	53.6%	Las Vegas, NV-AZ MA	Henderson	NV	89015	West Coast DC	226	0.5	5	36.2%	17.4%
42	0.532	54.1%	Greensboro-Winston-Salem- High Point, NC MA	Greensboro	NC	27409	Cranbury, NJ	512	1.0	2	36.7%	17.4%
43	0.529	54.6%	Salt Lake City-Ogden, UT MA	Salt Lake City	UT	84104	West Coast DC	634	1.3	5	36.7%	17.9%
44	0.514	55.1%	New Orleans, LA MA	New Orleans	LA	70131	Cranbury, NJ	1,278	2.6	4	37.2%	17.9%
45	0.493	55.6%	Norfolk-Virginia Beach- Newport News, VA-NC MA	Norfolk	VA	23505	Cranbury, NJ	316	0.6	2	37.7%	17.9%
46	0.484	56.1%	Raleigh-Durham- Chapel Hill, NC MA	Raleigh	NC	27612	Cranbury, NJ	463	0.9	2	38.2%	17.9%
47	0.469	56.6%	Memphis, TN-AR-MS MA	Memphis	TN	38122	Cranbury, NJ	1,052	2.1	3	38.7%	17.9%
48	0.468	57.1%	Sacramento, CA PMA	Rancho Cordova	CA	95742	West Coast DC	388	0.8	5	38.7%	18.4%
49	0.462	57.5%	Buffalo-Niagara Falls, NY MA	Buffalo	NY	14224	Cranbury, NJ	415	0.8	2	39.1%	18.4%
50	0.461	58.0%	Louisville, KY-IN MA	Louisville	KY	40205	Cranbury, NJ	720	1.4	3	39.6%	18.4%

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Indicates metro areas that would be assigned to a DC on the West Coast under most scenarios.