

# Spatial Analysis of Distribution Centers and Store Locations

Focusing on Amazon, CVS, Walgreens, and Walmart in Pennsylvania, Ohio, New York, New Jersey, Maryland, and West Virginia



## Introduction

In 2015, the retail industry in the United States had revenues of \$5.3 trillion. If automobiles, gas, and restaurants were excluded from this then the revenue would be \$1.2 trillion. Looking at Amazon, CVS, Walgreens, and Walmart, they had a combined total of \$531 billion dollars. This is 10% of the total market and 44% of the market when excluding the automobiles, gas, and restaurants. E-commerce sales accounted for 8% of total retail sales in the second quarter of 2016 and have increasingly grown each year. Amazon is the leader in this market so far with owning 26% of all internet retail sales.

## Research Question

Where are the warehouses and stores of Amazon, CVS, Walgreens, and Walmart located in Pennsylvania, Ohio, New York, New Jersey, Maryland, and West Virginia?

## Purpose

The purpose of this research project was to identify the locations of the warehouses and stores of Amazon, CVS, Walgreens, and Walmart. Another aspect of this project was to examine and analyze the spatial distribution of these stores in the states of Pennsylvania, Ohio, New York, New Jersey, Maryland, and West Virginia.

## Objectives

The first objective was to download a shapefile of the study area states of Pennsylvania, Maryland, New York, New Jersey, Ohio, and West Virginia. The second objective was to find data of the locations of the warehouses of the study companies of Amazon, CVS, Walgreens, and Walgreens that were situated within these states. The third objective was to find data of the locations of the stores of the study companies that were situated within these states. The fourth objective was to record the locations in excel to then use for geocoding.



Figure 1: Reference map showing the study area that was focused on during the project.

## Amazon and Walmart

- Amazon Distribution Centers
- Walmart E-Commerce Distribution Center
- Walmart Distribution Centers
- Walmart Stores

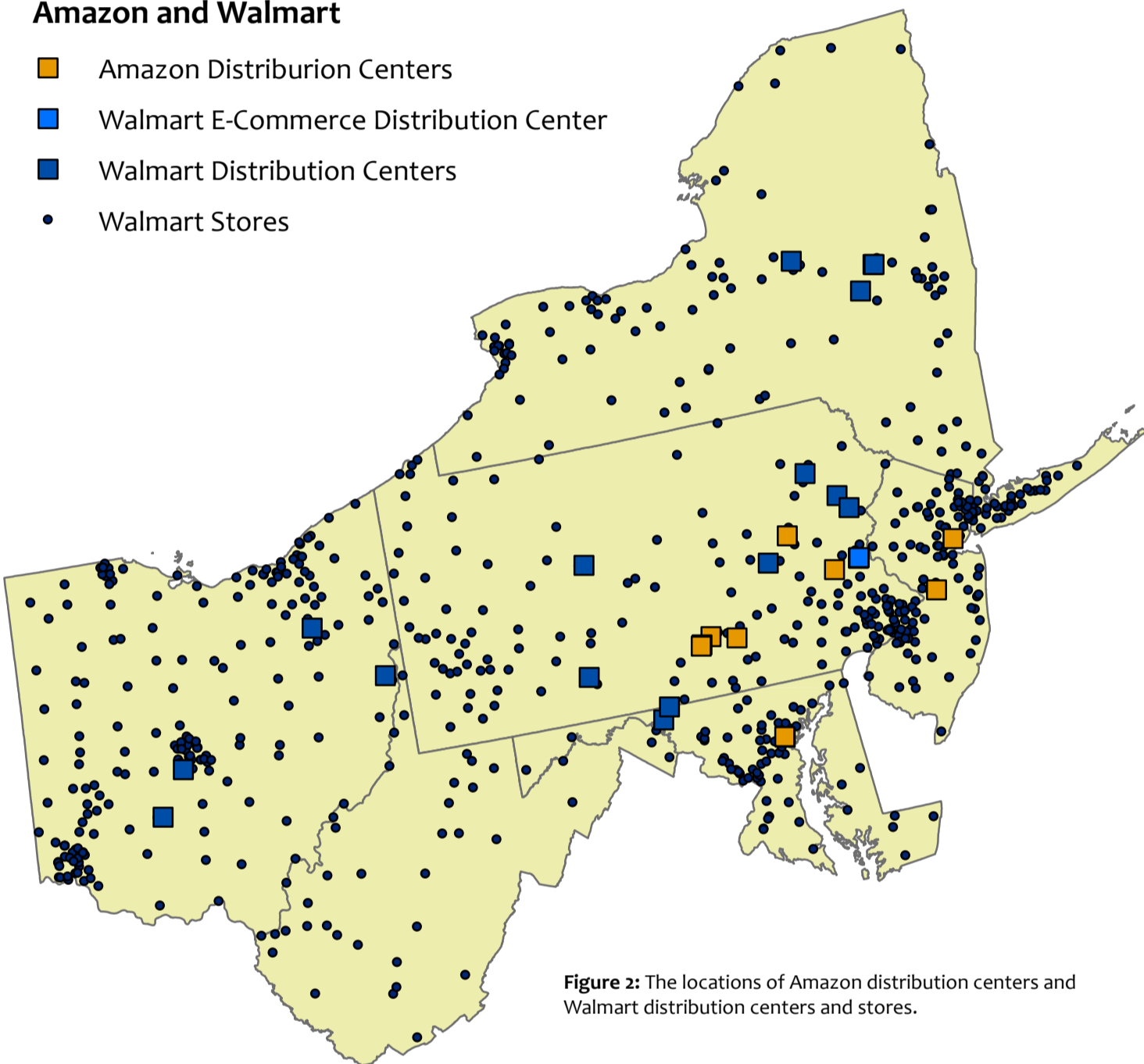


Figure 2: The locations of Amazon distribution centers and Walmart distribution centers and stores.

## Methods and Data

This lab was completed by first downloading a shapefile of the United States from the US Census Bureau. Next, a select by attribute was done with an SQL statement of state name = Pennsylvania or state name = Maryland or state name = West Virginia or state name = Ohio or state name = New York or state name = New Jersey. This allowed for only the states in the study area to be selected. A new layer was created from the selected features and they were then projected onto the USA Contiguous Equidistant Conic projection, in order to preserve distance, with their output being saved into the file geodatabase named Final Project. Next, data was located online and typed into excel of the addresses of the warehouses and the addresses of the stores for the companies of Amazon, CVS, Walgreens, and Walmart. Amazon warehouse data was found from Avalara Incorporated. CVS store and warehouse data was found on their website.

Walgreens store and warehouse locations was found on their website. Walmart store locations were found on their website, and their warehouse locations were found from WMPVL, a supply chain consulting firm. Each one was given a separate excel file saved in the CSV format in order to upload to QGIS to make the process of geocoding easier. Each spreadsheet contained the street address, the city, the state, and the country in order to match the fields required for QGIS to operate. Once done, the shapefiles were opened in ArcMap with each company's warehouses and stores projected onto the USA Contiguous Equidistant Conic projection, making sure to save them in the file geodatabase. The warehouses were symbolized as squares and the stores as circles using a different value within the same hue to signify the separation of the companies.

## CVS and Walgreens

- CVS Distribution Centers
- Walgreens Distribution Centers
- Walgreens Stores
- CVS Stores

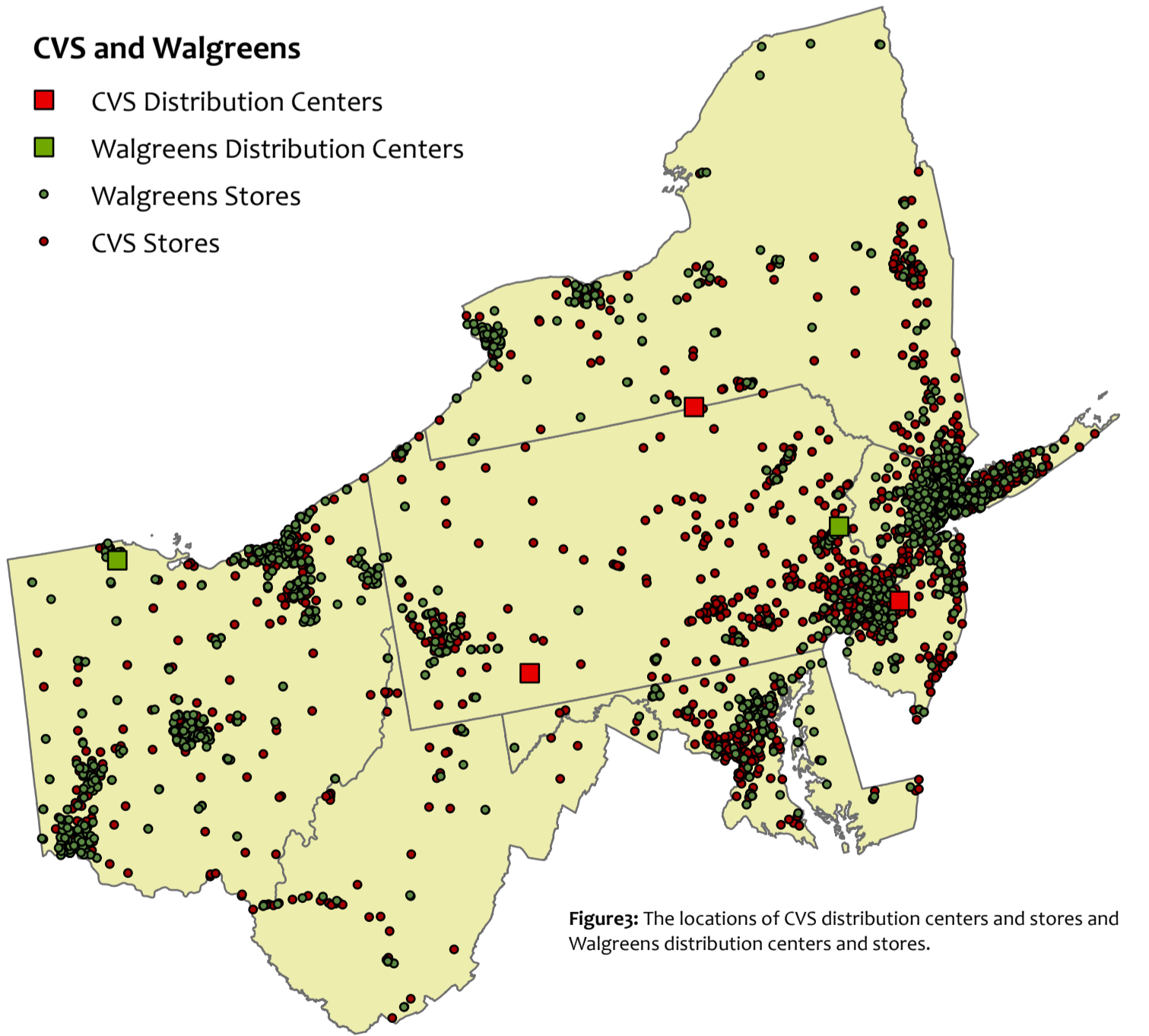


Figure 3: The locations of CVS distribution centers and stores and Walgreens distribution centers and stores.

## Results

The results of this project were actually surprising. Before finding all the data, the assumption was that Walmart would have the most store locations due to the fact that it was the top grossing retailer. However, looking at table 1, this is not the case because CVS has the most stores in the study area and Walgreens has the most stores in the United States. The reason for this could be due to the fact that a Walmart store is rather large, and takes up more real estate while a CVS or Walgreens can rent space out in small complexes, hospitals, or even in another store. In fact, in the study area there are 285 CVS stores that are located inside of a Target. However, comparing figure 2 and figure 3, a Walmart store is more likely to be located in a rural area compared to the two drugstores. This can be attributed to the fact that there is more space for a Walmart to be constructed there than in the city. Also, in the city there is an increased population resulting in more people, which requires more store locations.

Another interesting analysis of figure 2 and figure 3 is that most of the warehouses are located in Pennsylvania and fewer stores located in West Virginia. There are a total of 33 warehouses with 16 of them being located in Pennsylvania, accounting for 48% of the total warehouses in the study area. The reason for this could be due to geography of the interstate system in the state. There are a few major highways that connect the Pennsylvania to the rest of the United States. In West Virginia, the topography of the state makes it difficult for businesses to locate there. The mountains in the area make it hard to construct buildings and it is difficult for trucks to navigate roads that have steep gradient.

Table 1: The annual retail sales for 2015, along with how many stores and distribution centers are in the study area. The breakdown of how many stores for each company are located in each state.

Company	Walmart	Walgreens	CVS	Amazon
Total Sales	\$ 343 Billion	\$ 72 Billion	\$ 67 Billion	\$ 49 Billion
DCs in Study Area	18	2	3	10
Total Stores in US	5,109	8,157	7,808	None
Stores in Study Area	721	1,029	2,016	None
MD Stores	64	85	221	None
NJ Stores	86	194	334	None
NY Stores	182	372	556	None
OH Stores	191	241	378	None
PA Stores	158	121	471	None
WV Stores	39	16	56	None

## Conclusions

The objectives were completed in order to find a solution to the research question of where the warehouses and stores of the select companies were located in the study area. One thing that was learned while completing this project was using QGIS. This helped to aid in the process of geocoding, speeding it up instead of using an address locator in ArcMap. Another thing learned while completing this project

was the appreciation of data that is already compiled in excel.

A research question that was developed after completing this project was what is the spatial distribution of the warehouses and the stores of the other companies that are in the top ten grossing retailers in the same study area?

## References

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