

Final Report: Phase 1
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XYZ Corporation is a growing rapid-delivery transportation-service company that specializes in e-commerce and currently has warehouse depots set up outside the Dallas-Fort Worth (DFW) region of Texas. While XYZ is able to perform the preliminary pick-and-package steps for delivery in a consistent time frame, we will be focusing on the “last mile” portion of the process, which is physically delivering the product from a distribution center to the customer. Currently, the DFW area is one of the fastest growing areas in the nation (see Figure 1), and the counties we will be addressing are Dallas, Denton, Collin, and Tarrant (see Figure 2). Distribution centers have yet to be determined in the area but the task at hand is figuring out where to locate these distribution sites in order to meet consumer demands, and to consistently maintain the one-hour total time frame. The end goal for each customer is to be able to deliver a product within one hour of a customer ordering their product.

We are shown that the warehouses take 40 minutes maximum to complete the pick-and-pull process, which leaves the distribution centers no more than 20 minutes to deliver products to customers. Given this information, we need to determine optimal real estate locations for distribution centers in the DFW area. While XYZ’s intentions are to better serve customers who use their service frequently, they are also looking to expand the DFW market. XYZ’s consumer demographic typically leans toward middle aged men & women with a “steady” income. However, the DFW metroplex is a diverse region, and not all consumers will be in this set demographic.

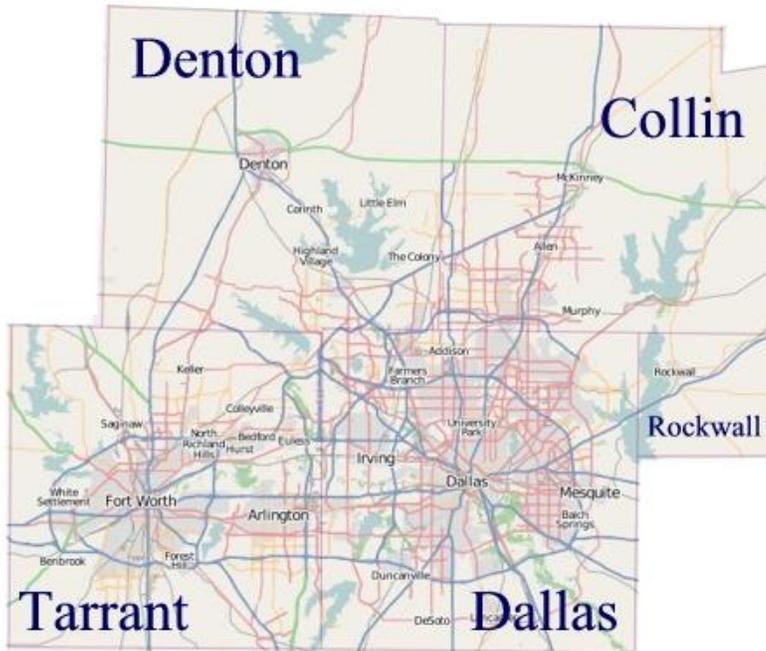
With that being said, our task consists of determining practical locations for these distribution centers. To find precise locations, we will be analyzing many variables. These variables include general demographic information, but also we will be taking advantage of the geographical locations of XYZ’s customer base within the DFW metroplex. Knowing where XYZ’s customers are located will serve as a basis for further analysis. Without knowing where XYZ’s customer base is, we would be unable to generate locations for warehouse depots that would best serve them.

There is no denying that DFW is a growing metroplex. XYZ’s infiltrations of this market can help create a lifetime customer base. However, because DFW is still a growing market, that should definitely be taken into consideration when analyzing geographical placement of new warehouse facilities. Placement in a developed area could cause sales to run stagnant, while placement in an underdeveloped area could mean a decrease in sales per quarter. Placement of the new facilities is crucial to the success of XYZ.

County	2017 Estimate	2010 Census	Change	Area	Density
Collin County	969,603	782,341	+23.94%	841.22 sq mi (2,178.7 km ²)	1,153/sq mi (445/km ²)
Dallas County	2,618,148	2,368,139	+10.56%	871.28 sq mi (2,256.6 km ²)	3,005/sq mi (1,160/km ²)
Denton County	836,210	662,614	+26.20%	878.43 sq mi (2,275.1 km ²)	952/sq mi (368/km ²)
Ellis County	173,620	149,610	+16.05%	935.49 sq mi (2,422.9 km ²)	186/sq mi (72/km ²)
Hood County	58,273	51,182	+13.85%	420.64 sq mi (1,089.5 km ²)	139/sq mi (53/km ²)
Hunt County	93,872	86,129	+8.99%	840.32 sq mi (2,176.4 km ²)	112/sq mi (43/km ²)
Johnson County	167,301	150,934	+10.84%	724.69 sq mi (1,876.9 km ²)	231/sq mi (89/km ²)
Kaufman County	122,883	103,350	+18.90%	780.70 sq mi (2,022.0 km ²)	157/sq mi (61/km ²)
Parker County	133,463	116,927	+14.14%	903.48 sq mi (2,340.0 km ²)	148/sq mi (57/km ²)
Rockwall County	96,788	78,337	+23.55%	127.04 sq mi (329.0 km ²)	762/sq mi (294/km ²)
Somervell County	8,845	8,490	+4.18%	186.46 sq mi (482.9 km ²)	47/sq mi (18/km ²)
Tarrant County	2,054,475	1,809,034	+13.57%	863.61 sq mi (2,236.7 km ²)	2,379/sq mi (919/km ²)
Wise County	66,181	59,127	+11.93%	904.42 sq mi (2,342.4 km ²)	73/sq mi (28/km ²)
Total	7,399,662	6,426,214	+15.15%	9,277.78 sq mi (24,029.3 km²)	798/sq mi (308/km²)

Figure 1. Population growth in DFW counties from 2010 to 2017.

DFW Metroplex Counties



Map ©OpenStreetMap contributors, CC-BY-SA

Figure 2. Counties of focus for analysis in DFW.

Goals For Analysis

We are looking to determine feasible locations for distribution centers to be set up in the Dallas Fort Worth Metroplex. Our goal for this analysis is to properly assess where to properly position up to five new distribution centers. In short, we are running basic analytics (drive time assessments, etc) in order to position distribution centers to serve the majority of DFW. The issue in this task lies in the fact that we want to minimize overlap between each new distribution center, yet we also want to maximize the total area XYZ is able to serve.

Prioritizing Market

In order to achieve this, we must prioritize the market in which XYZ plans on entering. This goal is not achievable without the raw data of XYZ's clientele along with physical locations of warehouse depots for sale/lease within DFW. The clientele XYZ is trying to attract is those who spend above the national average along with those who have the fiscal backing to support lavish lifestyles. However this not the only market XYZ plans to target. We will also be taking a look at areas in DFW that have a higher concentration density of online shopping. It is these two markets that XYZ must have control over in order to dominate the DFW market. However, this may exclude some marketing to those who are just shy of these two market, but with aid of Maptitude and Co-Star, we will be able to locate the optimal positions for new warehouse facilities to serve all of the customers in the DFW market. The people XYZ is in dyer need to be able to serve are those who are older and obviously well off and those who are younger and more technologically savvy.

Zoning

Zoning becomes an issue as well when examining physical location for a warehouse depot. We must take into consideration that all of XYZ's clientele will be living in a residential or mixed residential zoning. With that being known, logically, a feasible warehouse location will need to be placed in order to best suit the clientele without sacrificing drive time coverage.

However, it would be illogical (and probably illegal) to place a warehouse depot in the center of a residentially zoned area. Property for warehouses will have to be zoned as industrial or commercial. We will need to determine the most strategic location, near residential communities, yet zoned otherwise. The ideal zoning option for a new depot facility would be industrial. Having a property that is already zoned industrial would save XYZ time and money. Industrial properties tend to be located in cluster, and also tend to already be equipped with infrastructure suitable for a supply chain of this magnitude.

Techniques and Methodologies

Customer Base

In order to analyze the highest base of potential customers, we want to use the U.S. Census data to locate a few major groups of customers: high income households (over \$100,000/ year), families with a medium income (\$50k-100k/ year) within the range of 35-65 years of age, and college aged students who are more technologically advanced. We want to use the higher income families as they are more likely to pay for the convenience of online ordering and shipping to their household. We also want to use median income families as they make up the majority of the population in terms of households and are likely to order many products online. Lastly, we want to use college aged customers as they are the most likely to order, and their technological proficiency means they are more likely to order more often. While technological proficiency cannot be numerically characterized, we can predict college students by locating those within the age range of 18 to 34 years old and within a smaller radius of either a community college or a four-year university, as many within the aforementioned age group will reside either close to campuses or living in the dormitories/ commons on campus.

Building Attributes

Once we have the demographics that we need, we will also have to find suitable locations for XYZ's distribution centers within DFW. Using a real estate database provided by CoStar, we would like to look for four to five centers we find feasible for "last mile" operations to occur. Given the vast area in which XYZ is tasked with serving, we would like to find suitable buildings that have the following properties:

- Between 50,000 to 100,000 square feet
- Commercial or Industrial infrastructure
- Preferably an existing property to avoid construction costs
- Preferable standalone building
- Closer to a major road, such as a highway or interstate

In addition to the given list, other attributes we would like to consider is a location with a large parking lot, space for delivery bays (primarily for trucks), and accessibility from multiple sides to improve delivery times rather than limiting all traffic flow into and out of the facility to just one road. Of all the factors previously mentioned, one of them takes precedence over the others - location.

Location

Location is at the heart of many businesses, as it affects your local customer base and, in the case of XYZ Corporation, who can have their products delivered in the quickest manner. In many cases of delivery logistics, we would be accounting for the

distance in between the distribution center and the warehouse where the ordered products are pulled and packaged for delivery. In this case, we are assuming that the products from the warehouses will reach the distribution centers in the appropriate time frame.

When determining the locations for XYZ's distribution centers, we want to locate a site that has easy access to roads that allow long distance travel. Close proximity to a highway, interstate, or major connecting road helps reduce travel time as there is a shortage of stop signs, traffic lights, and higher speeds are allowed on these roads. Putting a distribution center further away from a major road will result in longer commute time, therefore eliminating the one-hour delivery window XYZ is looking to maintain.

As mentioned previously, we will be primarily catering to different groups of customers - maily, those with higher incomes or with more technological proficiency (usually between the ages of 18 to 60). We will want to locate property for distribution centers closest to these groups of customers, but not too close as we want to also be in proximity to other people in the area who will be delivering from XYZ.

Data Needs

As we run our analysis, we will be looking at multiple factors to determine our location setup. First, we will want to locate our high priority customer areas (as mentioned earlier) and determine which of these areas should be closer to our distribution centers. We will use the U.S. Census as well as open source statistical data of the DFW area to locate these customers. In our GIS analysis, we will put a higher weight on these pockets of high-priority customer so we can locate depots in closer proximity to them. Second, we want to determine possible distribution centers, favoring those with the attributes we mentioned earlier. While we may have to use some sites that aren't exactly what we are looking for, we want to get a prime location to set up warehouses. We will use CoStar's real estate database to determine these locations and we want to have no more than five centers established, and we would like to aim for less to minimize costs. Lastly, we will want to determine drive times from our possible distribution centers to areas of customers, especially ones with higher density and those that are more likely to use our services. This can be done in our Maptitude software as we are considering possible distribution center locations. In part with that, proximity to nearby highways should be taken note of with relation to key customers as previously mentioned.

Another factor we were looking at was the growth of individual districts in the DFW area throughout the next few decades. While major areas like downtown Dallas will always be growing, suburbs and developing neighborhoods on the outskirts of all the counties will be the fastest growing areas (see Figure 3) that must be considered for coverage. We would need to inspect the demographics (most likely through a census)

of these areas to see if they would be considered as a major target area with the key demographics that we stated earlier.

2005-2040 POPULATION GROWTH PROJECTIONS

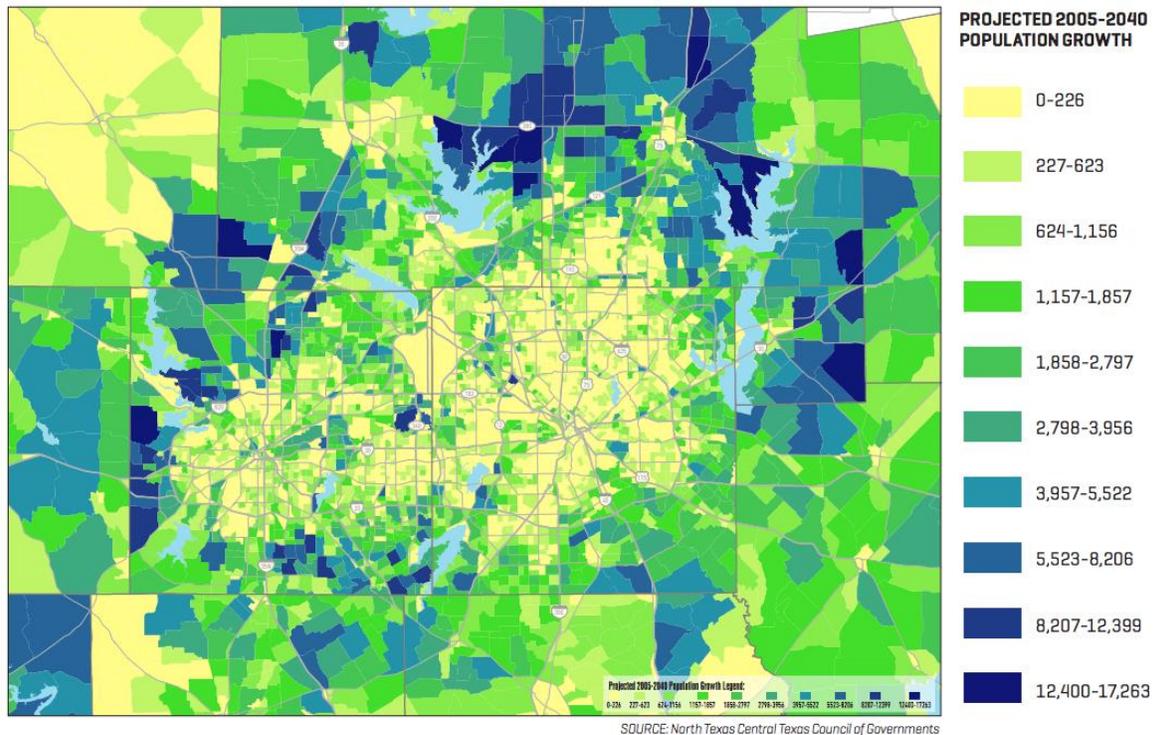


Figure 3. Growth projections of the DFW area between 2005 to 2040.

Longevity

As XYZ Corporation infiltrates the DFW market, a few things will have to be taken into consideration for the longevity of the business. We want to find locations that will enable XYZ to compete in this market for a very long time. The desired location for warehouse facilities should be in developing parts of the metroplex, as well as parts that have not yet peaked in population density. XYZ corporation wants to be able to serve this community for many, many years to come so selecting a site that will be able to pick certain depots without changing locations will be vital to establishing a strong presence in the region.

While no location will be absolutely perfect in terms of placement, we want to make sure XYZ has facilities that won't go under in a short amount of time, thus wasting time and money investments on competitive real estate. We would like to look for buildings with better infrastructure (those that usually have a better rating on sites like CoStar) since they have been marked as stronger, safer, more reliable, and sturdier.

Competitive strategies

As in any business decision there are going to be restraints. We have limited our searches to properties that are in DFW, properties that are zoned industrial, commercial and/or mixed zoning. However, financial cost still remains the issue. Money will dictate the size of the facilities we will be analyzing. The facilities must be approximately 50,000 square feet. However, it could be a stand alone building or a multi-tenant building. However, knowing XYZ's business model, a stand alone building would be most suitable.

When it comes to determining placement of depots, we should consider a slight overlap of coverage for the busiest delivery areas. As stated earlier, growth will be occurring in the area in the next few decades, so a possible strategy would be to cover each corner with one depot each and having an additional depot in the middle of all of them to cover gaps in delivery coverage, as well as deliver to essential areas that seem to be growing faster than others.

Summary

As XYZ continues to expand into the Dallas-Fort Worth area, they would like to establish distribution centers for their growing e-commerce business. Certain pockets of customers will take slight precedence over others, but we are going to assume everyone is on an even playing field and should be covered equally to maintain the "one-hour or less" delivery time. Sites that we want to consider for establishment would be closer to major roads and in close proximity to high density neighborhoods with a more affluent population and those with more technological prowess. Using our GIS software, knowledge of the census data, and real estate databases, we will aim to formulate the best possible option for XYZ Corporation to deliver parcels in a quick and effective manner to their customer base within the region.

References

Dallas Chamber of Commerce Population Growth between 2005 and 2040. Published 2018. *Dallas Economic Guide*.

https://www.dallaschamber.org/wp-content/uploads/2018/04/People-Pop_DensityGrowth.pdf

Dallas-Fort Worth Metroplex. Wikipedia.

https://en.wikipedia.org/wiki/Dallas%E2%80%93Fort_Worth_metroplex

Dallas City Data

<http://www.city-data.com/city/Dallas-Texas.html>