

XYZ CORP. – LOGISTICAL ANALYSIS PLAN

XYZ Corp. – Logistical Analysis Plan  
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## Introduction and Problem Statement

For this case study we will be working with the real-world challenge of last mile delivery which is defined as the movement of goods from a transportation hub to the final delivery destination. Last mile logistics has become a popular area of interest for retailers due to the growing nature of online sales and E-commerce. With this in mind we will be playing the role of (a new rapid-delivery transportation services provider) in the Dallas-Fort Worth (DFW) area. XYZ corporation has refined the process of picking and packaging at any one of their given distribution centers down to a maximum efficiency of 40 minutes with an additional 20 minutes dedicated towards actual delivery of the product. While XYZ Corp. has perfected the picking and packaging stages of their 60-minute total order-to-delivery window there is still the issue of last mile delivery, to satisfy their guaranteed 20 minute delivery window XYZ Corp. needs to identify an optimal series of locations for their distribution network from the ground up, it is also important to note that XYZ Corp. aims to shape its real estate acquisition decisions to fit its business clients desire to prioritize communities that represent the most lucrative customers XYZ corp. is interested in locating facilities that are at or around 50,000 square feet (SF) that require no rezoning and have adequate access for in and out shipping as well as adequate parking. In addition to our XYZ Corp. GIS analysis we will also be providing Invesco (a real estate investment company) with data pertaining to their long-term asset appreciation goals. Invesco is interested in purchasing industrial property in the DFW area with clients like XYZ Corp. being ideal candidates for leasing said property. Understanding what factors influence location acquisition of a company like XYZ Corp. is essential data needed for Invesco to make optimal investment decisions.

## Goals for Analysis

### Prioritizing Markets

XYZ Corp's business clients have specifically ask them to not only be able to provide 20-minute full coverage of DFW but to provide high accessibility to markets that have the financial resources to support high-expenditure lifestyles. To accomplish this, we are going to investigate two major market profiles, the first being the 40's to 50's age group. This older demographic is generally wealthier with more lavish spending tendencies like luxury vehicles, above average rates of home renovation as well as purchases pertaining to personal fitness and health. While this demographic may have the financial capabilities to be prime customers for XYZ clients they also tend to have a lack of exposure to online retail due to the recent shift away from brick-and-mortar stores to e-commerce which they lack experience with. The second market profile that XYZ Corp's clients are interested in is a younger demographic of 20 to 30-year-olds that may not currently have the financial resources of the aforementioned demographic but possess higher levels technical proficiency leading to above average use of e-commerce as well as a positive financial and career track. It is also Important to note that this demographic is well experienced with social media which is a predominate medium of e-commerce exposure and advertisement. While these demographics will be our primary targets for prioritization, we understand that XYZ Corp's business clients serve a complex client bases that have more than one profile. In essence we aim to identify areas with high densities of populations that are predisposed to purchasing XYZ's client's products at an above average rate and price point compared to the average consumer.

### Zoning

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Zoning is an extremely important part of the equation for finding the optimal locations for XYZ. While an area may demonstrate all of the key characteristics we are looking for, if it is not zoned for industrial use then this space is either unusable or XYZ will have to fight to rezone it. The idea of rezoning and renovating a site to fit the required attributes for XYZ's packaging and processing needs may seem like a good avenue do to the upfront savings associated with an unprepared. However, the uncertainty of cost and time that rezoning requires along with the cost of renovation is too great a risk to take. This leads us to limit our focus to identifying sites that are already industrially zoned with buildings that are currently equipped with the proper infrastructure to handle a large-scale package distribution operation like XYZ's.

### Location

Once we find which areas are zoned correctly for XYZ's needs we can then begin the process of acquiring specific locations that satisfy XYZ's distribution requirements. As mentioned before XYZ has a 60-minute total order-to-delivery window with pick and packaging taking up 40 minutes of that allotted time leaving 20 minutes for delivery from any potential location. One important thing to take into account will be the fluctuation of traffic, understanding which locations may be more or less affected by this will be imperative in establishing the most efficient distribution network. Traffic highs and lows can affect drive time range by decreasing or extending the coverage area of each location. This means choosing locations that can provide adequate coverage at peak traffic and the least amount of redundancy of overlapping delivery zones at times with no traffic. Another factor to consider is urban sprawl, with continued development of the DFW metroplex it is inevitable that carrier vehicles will run into construction related delays. While it is impossible to completely avoid these delays, we can identify locations with multiple transportation corridors to allow for various routes for product acquisition and delivery to reduce them. Identifying locations that provide access to potential workforce is yet another thing to consider when acquiring optimal locations (Thuermer 2017). What we mean by this is if we locate a facility to far away from residential areas where our potential workforce may be located this could adversely affect XYZ's employee retention and turnover rates (Hien 2018). While XYZ Corp. is specifically interested in identifying 5 locations for their distribution network, we are interested in the possibility of being able to provide the same coverage with 4 locations. If this is possible it would be extremely beneficial to XYZ Corp. by reducing facility costs allowing for investment in other sectors as well as simplifying logistical management.

### Building Attributes

After identifying the optimal areas around DFW the next step is to identify buildings with suitable characteristics that best serve the needs of XYZ. Understanding the correlation between the size of a given warehouse's service/catchment area and square footage may ultimately lead to more cost-efficient location selection decisions, the larger the catchment area the larger the population the larger the square footage required. While larger buildings do command higher prices, we will be focused finding buildings with the lowest cost per square foot to keep costs as low as possible. Along with this the building must have appropriate parking for workers as well as the in-and-out shipping fleet. With the XYZ's 20-minute delivery window, the delivery fleet must have adequate space for efficient high-volume product distribution. Beyond this the building must have direct access to roads compatible with 18-wheeler trucks as well as close proximity to major transportation corridors such as highways. A good example of this can be seen in (figure 1 below).



*Figure 1.* Note: close proximity to highway as seen in the lower part of the image as well as direct road access. (Feser 2018)

### Longevity

While focusing on the current market is immensely important it would be short sighted to not look ahead to where growth and development will be happening in the future, so that XYZ can maintain its position as a top rapid delivery transportation service. A reality of the market that XYZ Corp. serves is that the population is ever growing, it will be essential to XYZ's future success to consider where this growth will take place as well as the rate of the expected growth. Associated with the growth of population; growth of infrastructure will also need to be taken into account. It would be in XYZ's best interest to have an idea of growth projection so that they may have future site selection plans to expand their 5-site facility model when they can no longer sustain their 20-minute coverage window. Using current growth figures, we can make predictions of future potential markets for XYZ Corp. (see Figure 2). To compensate for the expected growth, we will investigate a possible location for a 6th site for XYZ to invest in.

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Rank	City	Population Growth Rate 2010-2016	Population 2016	Population 2010
1	<b>Prosper</b> 121 W. Broadway Prosper, TX 75078 972-346-2640 <a href="http://prosperedc.com">prosperedc.com</a>	93.1%	18,379	9,520
2	<b>Little Elm</b> 100 W. Eldorado Pkwy. Little Elm, TX 75068 214-975-0401 <a href="http://littleelmedc.org">littleelmedc.org</a>	64.3%	42,504	25,877
3	<b>Frisco</b> 6101 Frisco Sq. Blvd. Frisco, TX 75034 972-292-5000 <a href="http://friscotexas.gov">friscotexas.gov</a>	39.8%	163,656	117,056
4	<b>Forney</b> 101 E. Main St. Forney, TX 75126 972-564-7300 <a href="http://forneytexasedc.org">forneytexasedc.org</a>	38.3%	19,122	13,824
5	<b>McKinney</b> 222 N. Tennessee St. McKinney, TX 75069 972-547-7500	31.5%	172,298	131,025

Figure 2: the 5 fastest growing cities in DFW (Brandon Call 2017)

## Competitor strategies

While the presence of competition in the DFW market may be seen as a barrier to XYZ's entry into the market they do provide insight into the current industry. Understanding where competitors are located as well as understanding competitor business strategy will contribute towards making the most knowledgeable decisions for XYZ's distribution center locations. When looking at where competitors are located, we aim to understand surrounding infrastructure (road access, parking, vehicle compatibility). It will also be important to consider competitor business models for longevity in the DFW metroplex. Where are these companies expecting the formation of emerging markets and how they are preparing to service them will be good indications of the future proofing strategy XYZ should be taking. We will specifically be looking at Amazon Distribution network in DFW to understand how efficiently Amazon is servicing customer catchment areas.

## Analytical Choices

### Prioritizing Markets

Accurately determining which markets to prioritize will require engagement with a wide range of demographic market analysis tools that will produce both visual maps and reports exploit market trends. The primary software that will be used for this portion of the analysis is Business Analysis Web APP (i.e. BA web). This service will be used to visualize multiple market variables such as average income, education level, life insurance expenditures, age, and housing value. This data will be scaled to census tract blocks to provide us with the most precise view of our targeted markets. With this data we will then accurately analyze where XYZ's clients target market demographic is most likely located. Along with BA web we will be using Social Explorer, a similar mapping and geospatial data visualization tool to help accentuate demographic trends. (see figure 3).

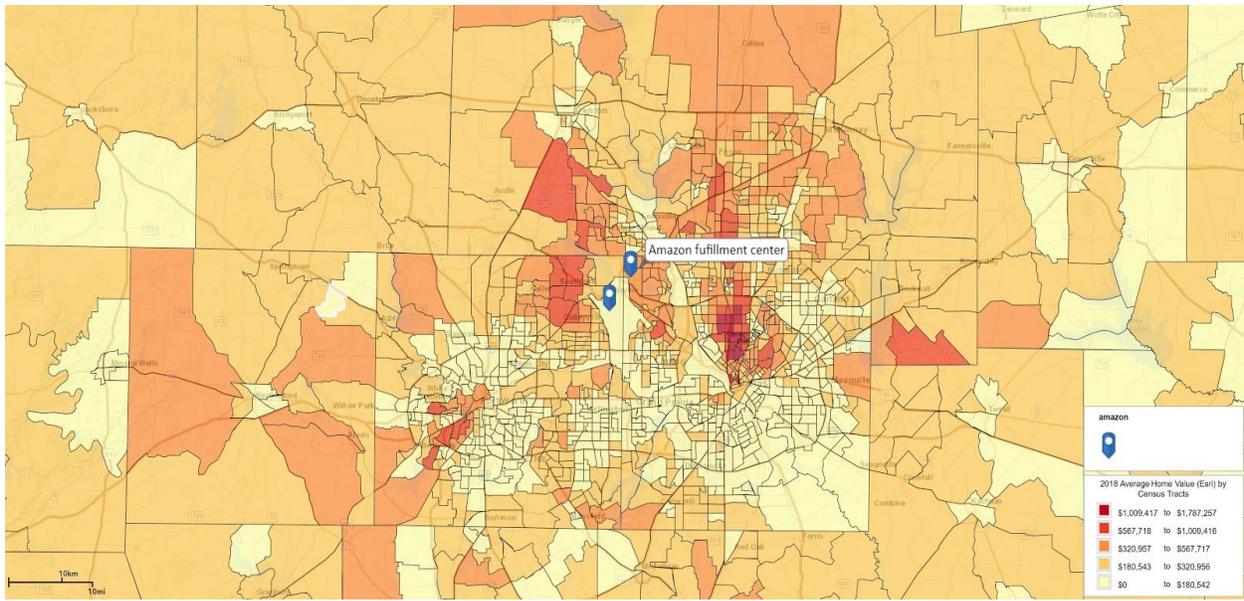


Figure 3: this is an example of a choropleth map depicting average home value with Amazon fulfillment centers overlaid

All of the aforementioned variables have a general positive correlation with wealth, identifying the areas where we continually observe all of these rates to be the highest will accurately determine which areas hold the highest density of XYZ’s client’s ideal consumers. While the wealthy segment of the population that we aim to target have some clear demographic trends associated with them. The younger population that may not currently have the same volume of expendable income but has a positive financial track and is predisposed to e-commerce is more elusive. To locate them we will be leveraging average income against education level to show where the population with the highest potential for income growth is situated. To account for which populations are most inclined to be making online purchases through e-commerce businesses like XYZ’s clients we will be mapping which locations have highest use of technology as well as technology related purchases for example purchases over the internet in the past 12 months. Also, important to note we can map competitor online sales such as Amazon through the use of BA web app to determine any pre-existing markets that fit XYZ client market profiles.

### Zoning

Zoning information for the 5 specific site locations that we will be identifying, will be provided by CoStar. CoStar is a tool that provides up to date information on commercial real estate listings like price, availability, market conditions, and in-depth building statistics. Using CoStar’s search function, we will locate potential sites that are currently zoned for industrial use in the areas that we find to be optimal for XYZ’s needs. While CoStar is helpful for specific site zoning information it is too refined for our analysis goals for Invesco. Invesco is more interested in general areas that have potential for asset appreciation due to the growth in demand for distribution center land use. To provide a broader view we will be using Maptitude to depict the industrial zoned areas around the DFW-metroplex to show where Invesco is actually able to invest in real estate.

### Location

For specific site selection we will be again be using CoStar’s site search function to determine which specific sites are available to us to run our geospatial analysis on. This will

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entail a trial and error process of trying a multitude of different site locations and combinations to achieve the best possible coverage with a 20-minute drive time while still providing high accessibility to prioritized markets. In order to produce this optimal coverage structure, we will use BA web app to create 20-minute drive time rings for each possible location. We will be taking consideration for traffic by having rings that not only account for the best possible traffic conditions (early am) but also the worst (rush hour), so that our 20-minute delivery coverage area is not over or estimated. Below is a graphic depicting the variability in coverage area that traffic can cause (see figure 4 & 5).

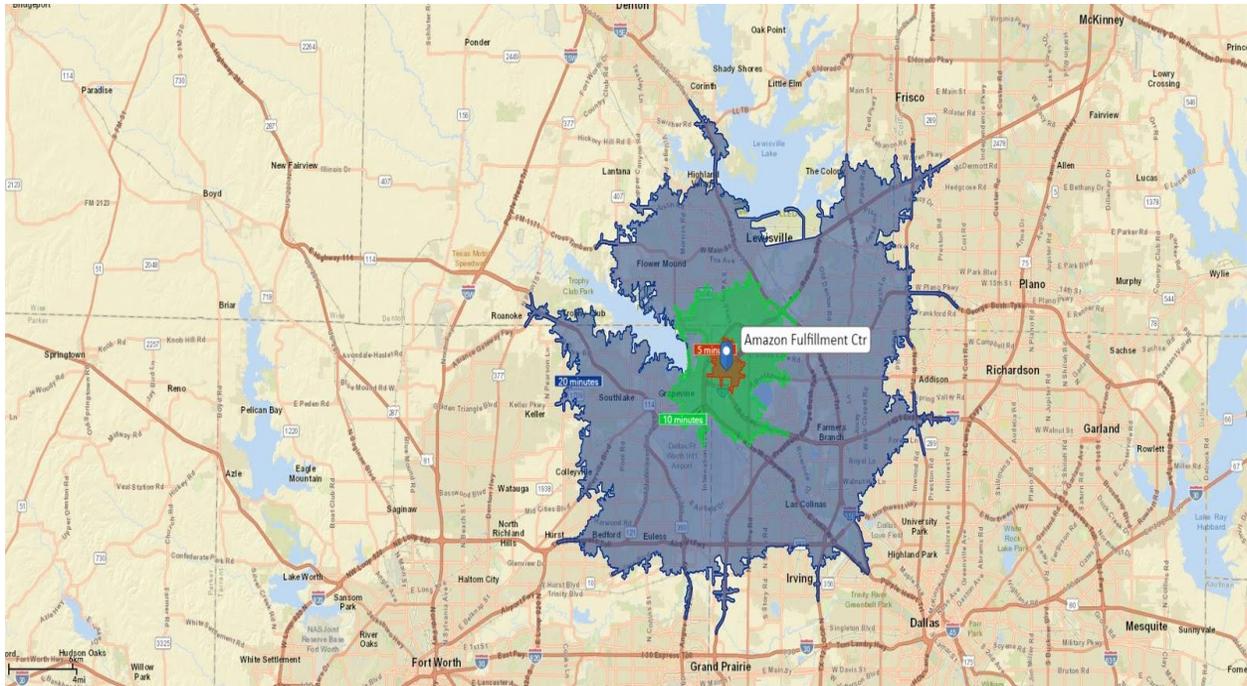


Figure 4 : coverage variability due to traffic based off an Amazon fulfillment center (4am)

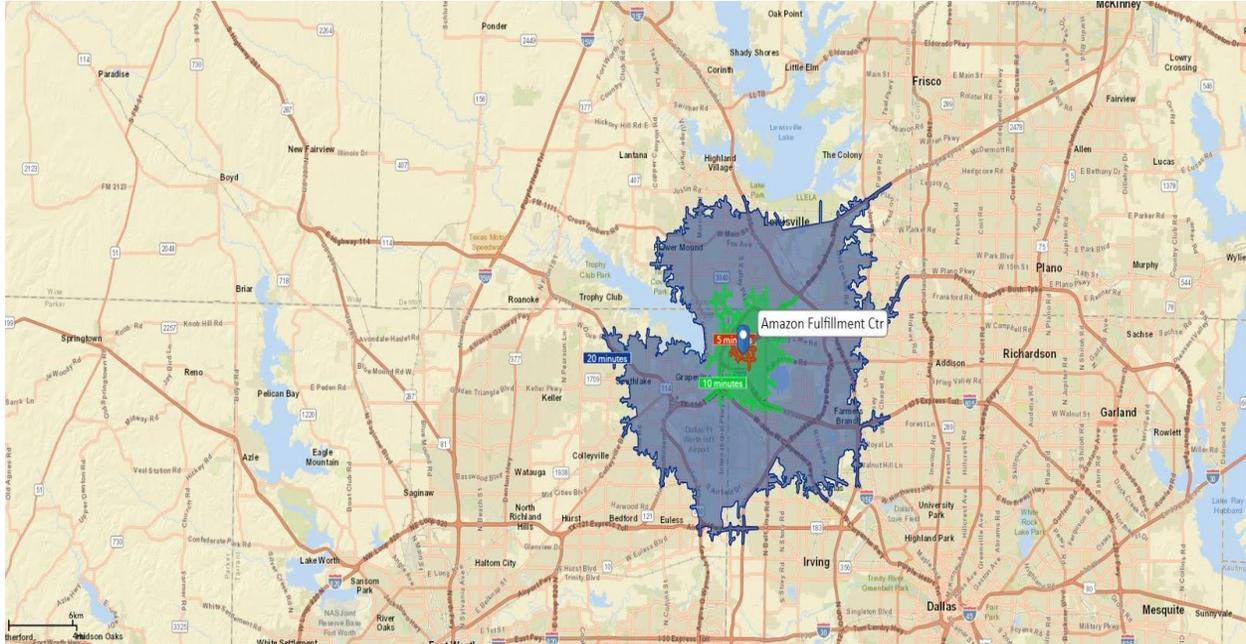


Figure 5 : coverage variability due to traffic based off an Amazon fulfillment center (5pm)

Note the variability in drive time range due to traffic intensity at different times of day. To ensure optimization of XYZ’s logistical network we also be running these analyses with a 4-site model to see if this would be feasible to service the same market area.

Another tool we will be employing is BA web app’s suitability index function which generates a suitability score for each provided site based off the established parameters. This will add another layer of depth to our statistical analysis helping us achieve most holistic view of the situation.

### Building Attributes

To find buildings with suitable attributes for XYZ we plan on using CoStar’s search function with a select set of parameters such as building type, above 50,000 sqft, and industrial usage. This portion of the research will be more or less just seeing what the specific location options available to us are. A key part of this decisive process is looking at the physical attributes of the building that is provided in CoStar’s photos as well as satellite imagery to see if factors like parking and road access are suitable. After identifying our options of suitable sites, we will then run our suitability analysis to decide which of our selected buildings are in optimal locations to provide the most well-rounded logistical infrastructure for XYZ.

### Longevity

To compensate for population and future market growth we will use BA web app to map were the largest growth has been in the past 10 years scaled to census tracts. This will not only give us a view of where to anticipate growth to happen in the future but by comparing the areas of where the most intense growth is happening to the previously mentioned maps of characteristics that indicate wealth. We can see what types of markets will be emerging and if they are worthy of identifying a 6th site to provide adequate coverage. To assess the possible 6th sites coverage potential we will apply the same previously mentioned drive time rings through BA web app as well as the properly weighted suitability index.

### Competitor strategies

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To gain insight into how XYZ's main competition Amazon is handling the same issues that we are facing we will be applying all the previous analysis to their current distribution center infrastructure. First, we will map where these facilities are located, then compare them to our projection of where our ideal markets are located to gauge their accessibility to the consumer. To understand more about what makes a building ideal we will review the characteristics of the building as well as the surrounding area. This will be accomplished through satellite imagery via Google Earth and through CoStar so we can make insightful comparisons to potential XYZ depot locations. To understand how Amazon is preparing for market growth in DFW we will compare their current facility locations to a 10-year population growth map. This will help shape our decision on whether a 6th site is necessary and if so where it should be located. To assess how efficient Amazon's current coverage is we will also be applying BA web app's drive time rings to understand how they have compensated for traffic fluctuations with the placement of their facilities.

### Data preparation

For our analysis we will require a vast amount and variety of relevant data from a multitude of sources. Our main sources of this data are BA web app, CoStar, Social Explorer, The U.S. Census Bureau, and Google Earth. For Business analyst web app majority of their data comes from the Census Bureau, this data goes through an extensive "quality control and quality assurance process" so we are less concerned about potential flaws in the data but understand that it is a possibility (Wombold 2012). As BA web is one of our main data resources it is important to note that they compensate for Census data error through a series of error adjustment methods. One of said methods being the Mean Algebraic Percent Error (MALPE). According to ESRI, MALPE "indicates whether estimates tend to be too low or too high. However, this test can overstate bias, since the lower limit is naturally capped at zero, while the upper limit is infinite." However, this is not the only means of data correction deployed by ESRI (Wombold 2012). ESRI also states "Another test, the Index of Dissimilarity (ID), measures allocation error, a more abstruse measure used by demographers to test the distribution of the population." (Wombold 2012). CoStar's data is all generated in house by their own research team, CoStar is the leader in the commercial real estate information because they have "built and maintained the industry's most comprehensive database of commercial real estate information." knowing this we are aware of the possibility but unconcerned by the potential of flaws in their data. Social Explorer sources the majority of their data from the Census Bureau as well as the FBI, and CDC. All of which are trustworthy sources with minimal potential for errors. Google Earth generates their product from a wide variety of satellite imagery sources, ranging from their own satellites to 3rd party ones. This data overall may have some flaws but for our limited use of it to view building attributes we should not encounter any. We also understand that each of our listed resources data may be slightly different so when producing maps of demographics, we will use multiple resources to try and mitigate influence of any potential data errors or discrepancies.

### Overall plan

As a GIS analysis on a research team working to understand the real estate acquisition and development opportunities available to XYZ Corporation our main goal is to identify the 5 most optimal locations for them to place their distribution centers. Our secondary goal is to identify similar but more general areas with high potential for long term asset appreciation for Invesco. To do both of these with highest level of confidence we will be analyzing a variety of data and investigating potential market areas. This will entail the use of many geospatial data

visualization tools like BA web app that we will use to map evidence that will provide us with most holistic and knowledgeable perspective to achieve the goals of XYZ Corp. and Invesco.

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