

GIS Final Project
Four Main Supermarket Chains in Chicago Area

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Abstract

This project utilizing ArcMap analyzes current locations of Whole Foods Market, Trader Joe's, Mariano's, and Jewel-Osco in Chicago area. The goal of this analysis is to explore the location strategy¹ of each supermarket chain based on relevant data. Per capita income, low education percent, distance within CAT stations (Miles), and special areas are considered as possible important factors for each chain's site selection. The addresses of supermarkets are geocoded, and per capita income is joined to the shapefile of Community Areas based on shared community number. Four factors play different roles in each chain's site selection. For example, Whole Foods Market leverages an intelligent site selection model that located its store in the place within 0.5 miles of CTA stations and people living in this place having high per capita income and high education level.

Introduction

Chains Selection

There is a new Jewel-Osco store opened near my apartment this year. Actually, I always went to another Jewel- Osco store before this store opening. One day, I wondered which one I should go and at that time I realized that those two stores just located closet to two CTA stations, Grand and Clark/Division stations. Finally, I decided to go to the new one because there was a bus line I could choose as well. I don't think I am the only one makes a decision based on store's accessibility, so I choose four chains including Whole Foods Market, Trader Joe's, Mariano's, and Jewel-Osco which are supermarkets chains I am always shopping to find reasonable reasons to explain their site selection.

Research Topic and Hypotheses

This project is about what are their correlations between per capita income, low education percent, distance within CAT stations (Miles) and special areas² and the location of Whole Foods Market, Mariano's, Jewel-Osco, and Trader Joe's in Chicago community areas.

I have three hypotheses about site selection for those four chains.

1. In order to attract large about of people to shop, all chains will take consider accessibility as an important factor to locate their store. It means that those four chains are more like to locate nearby CTA stations which people can easily go shopping, even though four chains target different demographic guests.
2. Whole Foods Market and Mariano's mainly provides organic and fresh products at higher costs. They appear to locate their stores in more affluent areas and target higher education level people with more healthy and organic awareness. While Jewel-Osco and Trader Joe's provide products at a lower price, they are more likely to locate their stores in the area where people have lower income with lower education level.
3. Whole Foods Market and Mariano's are less likely to locate in special areas to gain government financial incentives, while Jewel-Osco and Trader Joe's are inclined to consider government financial incentive as an important factor to maximize their profit when they target low-income guests.

¹ Mounica, Vennamaneni Whole. Jul 15, 2017. Foods Market, Marketing Strategies and Programs Analysis. <https://medium.com/@mounicav/whole-foods-market-marketing-strategies-and-programs-analysis-53d6f12b6055>. Accessed August 4, 2018.

² Special areas include empowerment zones, enterprise zones, industrial corridors, tax increment financing districts in this report.

Methodology

Data

There are two datasets in the format of CSV file and eight datasets in the format of shapefile. Census data and all shapefiles showed as below are downloaded from the City of Chicago official website.

CSV files

1. Census Data - Selected socioeconomic indicators in Chicago, 2008 – 2012

This dataset contains a selection of six socioeconomic indicators of public health significance and a “hardship index,” by Chicago community area, for the years 2008 – 2012. I only focus on two indicators, the percent of persons over the age of 25 years without a high school diploma and per capita income.

2. List of supermarkets

This dataset is manually collected from google map. It contains names of supermarkets, full address, longitude, latitude, and zip code of 10 Whole Foods Market stores, 5 Trader Joe's stores, 18 Mariano's stores, and 20 Jewel-Osco stores in Chicago area.

Shapefiles

1. CTA - 'L' (Rail) Lines
2. CTA - 'L' (Rail) Stations
3. Boundaries - Community Areas (current)
4. Empowerment_20Zones. Empowerment zones are economically distressed communities designated by government for aid—but this aid is intended primarily to lift the communities out of poverty by stimulating business enterprise and creating jobs.³
5. Boundaries - Enterprise Zones. The Illinois Enterprise Zone Program is designed to stimulate economic growth and neighborhood revitalization in economically depressed areas of the state.⁴
6. Boundaries - Industrial Corridors. An industrial corridor is a package of infrastructure spending allocated to a specific geographical area, with the intent to stimulate industrial development.⁵
7. Boundaries - Tax Increment Financing Districts. Tax Increment Financing (TIF) is a special funding tool used by the City of Chicago to promote public and private investment across the city.⁶

Process Data

The first step of process data is to rename Census Data - Selected socioeconomic indicators in Chicago as per capita income since only two indicators mentioned previously will be included in the following analysis. In order to import this dataset to ArcMap successfully, names of columns are also renamed shorter without special signs and the dataset is converted into the format of Excel worksheet. Finally, this processed dataset is joined to Boundaries - Community Areas (current) shapefile based on shared column area number as the string.

³ Empowerment Zones. www.inc.com/encyclopedia/empowerment-zones.html. Accessed August 5, 2018.

⁴ Illinois Department of Commerce & Economic Opportunity. Illinois Enterprise Zone Program. www.illinois.gov/dceo/expandrelocate/incentives/taxassistance/pages/enterprisezone.aspx. Accessed August 5, 2018.

⁵ Wikipedia. Industrial corridor. https://en.wikipedia.org/wiki/Industrial_corridor. Accessed August 5, 2018.

⁶ City of Chicago. Tax Increment Financing (TIF). www.cityofchicago.org/city/en/depts/dcd/provdrs/tif.html. Accessed August 5, 2018.

The latitude and longitude of stores are collected using free batch geocoding tool based on stores' addresses. The Display XY Data function in ArcMap is used by setting Lat = Y Coordinate and Long = X Coordinate turning an excel table into a temporary point layer. To save this as a permanent shapefile that I can edit and analyze, I exported the "events" layer to a shapefile.

Visualize Data

Since there are more than five symbol classes of CTA stations and lines, some classes having multiple stations or lines are manually combined into one group using Group values except for a class with the red, brown, and purple part. This exception is to get rid of the misunderstanding of the red line in some areas. The combined class of lines and stations are marked in black, all most of them located within the Chicago loop area.

Graduated color symbology is used to show a quantitative difference in per capita income. My classification scheme has five classes by utilizing manual break. Symbol colors are selected using the Color Brewer tool that the lighter purple is corresponding to lower per capita income and the darker purple is corresponding to higher per capita income. As you can see in the legend of the map, for per capita income, the minimum median income is \$8,201 and the maximum median income is \$88,669. The range of each class is the same with that of US. Census Median Income map. For education level, the lowest low education percent ranges from 2.5% to 10% in darkest purple while the highest low education percent ranges from 40.1% to 54.8% in lightest purple. The unique value is used to show the qualitative difference of locations of four supermarket chains, Whole Foods Market, Trader Joe's, Mariano's, and Jewel-Osco. Four supermarket chains are represented as dark green, orange, red, and light green triangles respectively.

In addition, The Select By Attributes function allows me to select supermarket name = "Whole Foods Market", "Trader Joe's", "Mariano's", and "Jewel-Osco" individually, and then create individual layers respectively. The Select By Location function lets me select features based on stores' locations relative to features in the layer of CTA lines. For instance, If I want to know how many stores of each chain are located within mile/ miles of CTA stations, I select "Whole Foods Market", "Trader Joe's", "Mariano's", and "Jewel-Osco" individually, and manually select and record of number of stores within specific miles from 0.1 to 2.1. (The furthest distance away from the nearest CTA station)

Analysis

Whole Foods Market⁷

Per Capita Income

Six of Whole Foods Market stores are in communities having highest per capita income range of \$600,001 to \$88,669. It means Whole Foods Market are inclined to target people who have a high income. This is matched with the concept of this chain that provides high-quality products at the premium price. I think Whole Foods Market is more likely to open the store in Near South Side (33) and North Center (5) only considering the factor of per capita income. Because those two are communities falling into capita income range of \$50,001 to \$60,000. After opening the new stores in those two

⁷ Whole Foods Market. www.wholefoodsmarket.com/company-info/real-estate. Accessed August 7, 2015.

communities, it may open stores in West Town (24), Near West Side (28), and Edison Park (9) which falls into per capita income range of \$400,001 to \$50,000.

Low Education (%)

Nine of Whole Foods Market stores located in communities have lower low education percent meaning high education level people is target market. Only considering the factor of education level, Whole Foods Market are more likely to open new stores in Edison Park (9), Near West Side (28), Near South Side (33), Beverly (72), and Mount Greenwood (74) which fall into low education percent ranging from 2.5% to 10%.

Distance within CAT Stations (Miles)

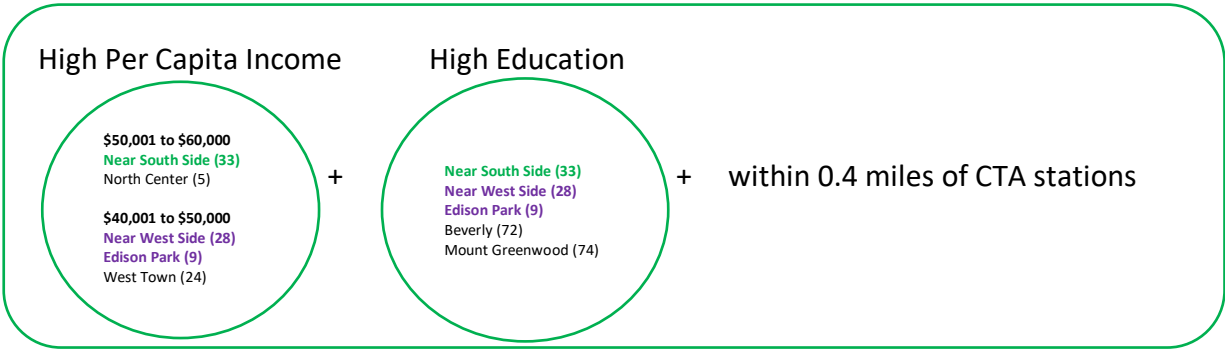
Eight of Whole Foods Market stores are located within the 0.4 miles of CTA stations in the downtown area and two of them are located just at the 1.6 miles away from the nearest CTA station. Whole Foods Market prefer the place where are near to CTA station to attract more guests to shop in the store. Two stores are located beyond 0.4 miles of CTA station are considered as special cases. One store is in the north of Chicago, and another store is in the south of Chicago, both are not in the downtown area. The car will be the first choice instead of CTA lines for people who live in communities when they go to the supermarket.

Special Areas

Six stores located in Lake View (6), Lincoln Park (7), Near North Side (8), Hyde Park (41), and Englewood (68) are just within tax increment financing districts. Only one store located in Englewood (68) which just in enterprises zone. Only one store located in Near North Side (8) just at the industrial corridor.

Results and Findings

In general, Whole Foods Market leverages an intelligent site selection model that located its store in the place within 0.5 miles of CTA stations and people living in this place having high per capita income and high education level. What’s more, Whole Foods Market may consider the benefits of tax increment financing as a factor in doing site selection. Based on Whole Foods Market concept, target customers for it are individuals and families whose income is well above the national average, lead a healthy lifestyle and conscious of the environment. Most of the customers have college degrees and live in upscale suburban or metropolitan areas.



Considering multiple factors analyzed above, Whole Foods Market is more likely to open new stores in Near South Side (33) and within 0.4 miles of CTA stations if tax increment financing benefit is available. And then it can consider opening a line of new stores in Near West Side (28) or/and Edison Park (9) within 0.4 miles of CTA stations if tax increment financing benefit is available.

Trader Joe's⁸

Per Capita Income

Five Trader Joe's stores located in communities have highest per capita income range of \$600,001 to \$88,669 and range of \$400,001 to \$50,000. It means Trader Joe's is also inclined to target people have a high income, even though its price is more reasonable than that of Whole Foods Market. I think Trader Joe's is more likely to open stores in Loop (32) and Lake View (6) first, and then in Edison Park (9), Forest Glen (12), West Town (24), Near West Side (28) only considering the factor of per capita income. Because the first two communities which fall into capita income range of \$600,001 to \$88,669 and the rest of the communities which fall into the range of \$400,001 to \$50,000.

Low Education (%)

All of Trader Joe's stores locate in communities having the lowest low education percent meaning high education level people is also target market. Only considering the factor of education level, Trader Joe's is more likely to open new stores in Lake view (6), Loop (32), Near West Side (28), Edgewater (77), Edison Park (9), Forest Glen (12), Hyde Park (41), Beverly (72), and Mount Greenwood (74) which fall into low education percent ranging from 2.5% to 10%.

Distance within CAT Stations (Miles)

As you can see in **Table 3**, one Trader Joe's store in Near South Side (33) locates within 0.1 miles of CTA station, two stores in Near South Side (33) and Near North Side (8) locate within 0.2 miles of CTA stations, four stores in Near South Side (33), Near North Side (8), Lincoln Park (7), and North Center (5) locate within 0.3 miles of CTA stations. All Trader Joe's stores in the Chicago area locate in the place within 0.4 miles of CTA stations.

Special Areas

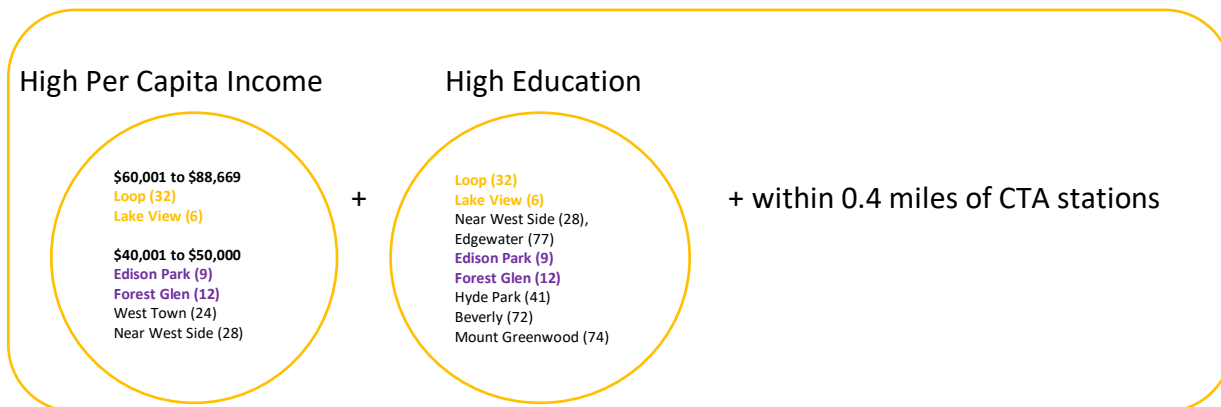
In the Chicago area, only one Trader Joe's store located in Lincoln Park (7) is just at the industrial corridor. Three stores located in North Center (5), and Lincoln Park (7) are just within tax increment financing districts.

Results and Findings

In general, Trader Joe's leverages an intelligent site selection model that locate its store in the place within 0.4 miles of CTA stations and people living in this place having high per capita income and high education level. This strategy seems not matched with Trader Joe's cheaper price compared with Whole Foods Market. However, this conflict could be explained by Trader Joe's concept that provides high-quality but inexpensive. Private-label products of Trader Joe's support for it to open a line of stores within communities with many Whole Foods Market stores. Based on limited analysis of Trader

⁸ University of California. 2017. Trader Joe's No average Joe Essay. <https://studymoose.com/%EF%BB%BFtrader-joes-no-average-joe-essay>. Accessed by August 12, 2018

Joe's in the Chicago area, it is hard to say this chain will or will not consider locating a special area is an important factor to select a site.



Considering multiple factors analyzed above, Trader Joe's is more likely to open a new store(s) in Loop (32) or/and Lake View (6) and within 0.4 miles of CTA stations. After that, it will consider open new stores in Edison Park (9) or/and Forest Glen (12) within 0.4 miles of CTA stations.

Mariano's⁹

Per Capita Income

Mariano's almost targets guests who come from all levels of per capita income. Eleven Mariano's stores locate in per capita income ranging from \$8,201 to \$40,000. The rest of stores spread across other levels of per capita income.

Low Education (%)

Six of Mariano's stores locate in communities having low education percent ranging from 2.5% to 10%, six of them locate in communities having low education percent ranging from 10.1% to 20%, and the rest of them spread in the range of 20.1% to 54.8%.

Distance within CAT Stations (Miles)

Eight stores located in Austin (25), Jefferson Park (11), Lincoln Square (4), North Center (5), Logan Square (22), South Lawndale (30), Bridgeport (60), New City (61) are just at industrial corridors. Eleven stores located in Edgewater (77), Lincoln Square (4), North Center (5), Lake View (6), Near North Side (8), Austin (25), Near South Side (33), South Lawndale (30), McKinley Park (59), New City (61), and Grand Boulevard (38) are just within tax increment financing districts.

Special Areas

Eight stores located in Austin (25), Jefferson Park (11), Lincoln Square (4), North Center (5), Logan Square (22), South Lawndale (30), Bridgeport (60), New City (61) are just at industrial corridors. Eleven stores located in Edgewater (77), Lincoln Square (4), North Center (5), Lake View (6), Near North Side (8), Austin (25), Near South Side (33), South Lawndale (30), McKinley Park (59), New City (61), and Grand Boulevard (38) are just within tax increment financing districts.

Results and Findings

⁹ Erik, J. Martin. 2013. Meet Mariano's. www.cspdailynews.com/sites/default/files/magazine-files/F1-Marianos-1113.pdf. Accessed August 7, 2015.

In general, Mariano's considers locating its store in the place within 0.2 to 1 mile of CTA stations and people living in this place having lower per capita income and high education level. Compared with Whole Foods and Trader Joe's, Mariano's mainly is inclined to target people have lower income. This is matched with this chain provides good quality products with lower price. Different from Whole Foods and Trader Joe's, Mariano's may consider special areas including industrial corridors and tax increment financing districts as a factor when doing site selection. However, this factor plays a more important role for Mariano's than that for Whole Foods and Trader Joe's.

Jewel-Osco

Per Capita Income

There are 20 Jewel-Osco stores located in the Chicago area. Seven of them locate in communities which fall into the highest per capita income range of \$600,001 to \$88,669. Those communities are Lake View (6), Lincoln Park (7), Near North Side (8), Loop (32). There are three stores located in North Center (5), and Near South Side (33) falling into per capita income range of \$500,001 to \$60,000, four stores located in West Town (24), and Near West Side (28) falling into per capita income range of \$400,001 to \$50,000, four stores located in Edgewater (77), Avondale (21), and Uptown (3), Douglas (35) falling into per capita income range of \$200,001 to \$40,000, and two stores in McKinley Park (59), and West Elsdon (62) falling into per capita income range of \$8,201 to \$20,000. As you can see on the map, there are even have three stores in Lake View (6) and Near West Side (28), two stores in Near North Side (8), Near West Side (28) and North Center (5).

Low Education (%)

Fourteen of Jewel-Osco stores locate in communities which fall into the lowest of persons over the age of 25 years without a high school diploma ranging from 2.5% to 10%. Those communities are North Center (5), Lake View (6), Lincoln Park (7), Near North Side (8), Loop (32), Near West Side (28) Near South Side (33), and Edgewater (77). There are three stores located in Uptown (3), West Town (24), and Douglas (35) which fall into the second low education percent level ranging from 10.1% to 20%, one stores located in Avondale (21) falling into the second low education percent level ranging from 20.1% to 30%, two stores located in McKinley Park (59), and West Elsdon (62) falling into low education percent ranging from 30.1% to 40%. No any stores fall into low education percent ranging from 40.1% to 54.8%.

Special Areas

Four stores located in Avondale (21), North Center (5), and Lincoln Park (7) are just at industrial corridors. Sixteen stores located in Edgewater (77), Uptown (3), North Center (5), Lake View (6), Lincoln Park (7), Near North Side (8), Avondale (21), Near West Side (28), Near South Side (33), McKinley Park (59), and West Elsdon (62) are just at the tax increment financing districts. Only one store located in Douglas (35) is just at the empowerment zone, and only one store located in Near West Side (28) is just at enterprises zone.

Distance within CAT Stations (Miles)

As you can see on table, four Jewel-Osco stores locate within 0.1 miles of CTA stations, five store locates within 0.2miles of CTA station, ten stores locate within 0.3 miles of CTA stations, thirteen stores locate within 0.4 miles of CTA stations, fourteen stores locate within 0.5 miles of CTA stations,

seventeen stores locate within 0.6 miles of CTA stations, and eighteen stores locate within 0.7 miles of CTA stations, and nineteen stores locate within 0.8 miles of CTA stations. All of them locate in the place within 1.1 miles of CTA stations.

Results and Findings

In general, Jewel-Osco mainly considers locating its store in the place within 0.6 miles of CTA stations. Jewel-Osco almost targets guests who come from all levels of per capita income. As you can see, Jewel-Osco looks more aggressive than the other chains mentioned above. There are even have three Jewel-Osco stores in Lake View (6) and Near West Side (28), two Jewel-Osco stores in Near North Side (8), Near West Side (28) and North Center (5). I think Jewel-Osco may open the second store in communities it has one store already without strong competition from other chains. Jewel-Osco may also consider benefits of industrial corridors and tax increment financing. However, it is less heavily relying on those benefits than Mariano's does.

Conclusion

Each supermarket chain has its own location strategy considering multiple factors to locate its store. The importance of factors may change a little including real situation, for example, the benefit of tax increment financing is available in the Chicago area but not for all of US.

Future Work

All stores of each supermarket chain are selected within the Chicago area. It may not represent all stores of each supermarket chain in Illinois, or even in the US. Because the policy of each state varies that result in each chain considering how to take the most use of policy to maximize revenue. It means there are more factors should be included to come up with a site selection model of each chain.

Special areas only cover empower zones, industrial corridors, enterprise zones, and tax increment financing districts. The planning districts could be considered as special area as since the company will target those areas before launching planning districts. In addition, in my analysis part, I concluded that Mariano's and Jewel-Osco may consider tax increment financing benefit as an important factor in site selection based on the map. However, it is may not the casual case. It means that I must find more sources to demonstrate or prove this idea.

Tables

Chain No. of stores	Table 1 Per Capita Income High →				
	\$8,201 - \$20,000	\$20,001- \$40,000	\$40,001- \$50,000	\$50,001- \$60,000	\$60,001- \$88,669
Whole Foods Market (10)	1	2	1	0	6
Trader Joe's (5)	0	0	0	2	3
Mariano's (18)	5	6	2	2	3
Jewel-Osco (20)	2	4	4	3	7

Chain No. of stores	Table 2 Low Education (%) High → (The percent of persons over the age of 25 years without a high school diploma)				
	2.5% - 10%	10.1% - 20%	20.1% - 30%	30.1% - 40%	40.1% - 54.8%
Whole Foods Market (10)	9	0	1	0	0
Trader Joe's (5)	5	0	0	0	0
Mariano's (18)	6	6	3	1	2
Jewel-Osco (20)	7	3	4	4	2

Chain No. of stores	Table 3 Distance within CAT Stations (Miles)											
	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	1	1.1	1.6	2.1
Whole Foods Market (10)	2	5	7	8	8	8	8	8	8	8	10	-
Trader Joe's (5)	1	2	4	5	-	-	-	-	-	-	-	-
Mariano's (18)	0	1	4	6	9	9	9	9	11	11	17	18
Jewel-Osco (20)	4	5	10	13	14	17	18	19	19	20	-	-

Chain No. of stores	Table 4 Special Areas Note: Tax Increment Financing Districts (TIF Districts)			
	TIF Districts	Enterprise Zones	Industrial Corridors	Empowerment Zones
Whole Foods Market (10)	6	1	1	0
Trader Joe's (5)	3	0	1	0
Mariano's (18)	11	0	8	0
Jewel-Osco (20)	16	1	4	1

Reference

1. Mounica, Vennamaneni Whole. Jul 15, 2017. Foods Market, Marketing Strategies and Programs Analysis.<https://medium.com/@mounicav/whole-foods-market-marketing-strategies-and-programs-analysis-53d6f12b6055>. Accessed August 4, 2018.
2. Empowerment Zones. www.inc.com/encyclopedia/empowerment-zones.html. Accessed August 5, 2018.
3. Illinois Department of Commerce & Economic Opportunity. Illinois Enterprise Zone Program. www.illinois.gov/dceo/expandrelocate/incentives/taxassistance/pages/enterprisezone.aspx. Accessed August 5, 2018.
4. Wikipedia. Industrial corridor. https://en.wikipedia.org/wiki/Industrial_corridor. Accessed August 5, 2018.
5. City of Chicago. Tax Increment Financing (TIF). www.cityofchicago.org/city/en/depts/dcd/provdrs/tif.html. Accessed August 5, 2018.
6. Whole Foods Market. www.wholefoodsmarket.com/company-info/real-estate. Accessed August 7, 2015.
7. University of California. 2017. Trader Joe's No average Joe Essay. <https://studymoose.com/%EF%BB%BFtrader-joes-no-average-joe-essay>. Accessed by August 12, 2018
8. Erik, J. Martin. 2013. Meet Mariano's. www.cspdailynews.com/sites/default/files/magazine-files/F1-Marianos-1113.pdf. Accessed August 7, 2015.

