

StoryMap: <https://storymaps.arcgis.com/stories/335c5960455c495cb68e1f3ee75050a7>

## GIS Implementation in Costco

For our final project, the blue team has chosen to implement GIS with the company Costco, specifically for their sales sector. The company itself was established in 1976 under the name of “Price Club” in San Diego, CA. What started out as a single warehouse location with minimal profits in the late 1970’s grew rapidly over the next few decades, eventually becoming a worldwide retail chain with over 800 locations and 64 billion dollars reported in total sales as of 2021. While Costco is an incredibly successful business, GIS technology would allow for management to further improve their sales and marketing tactics by aligning them to the spatial data provided by GIS technology.

The business problem that we would be solving is any type of inefficiency in Costco’s sales and merchandising orders. Costco carries a variety of products and rotates their inventory quite often throughout the year. This could be seasonal as well as monthly or however the company sees fit. What we plan to help with is Costco’s ability to see what their customers are most interested in so that they can stock the shelves with the products that will be bought the most. The reason we have to use GIS and can’t generalize all stores is because there are a wide variety of people and demographics at a given store so not all stores will have the same popular inventory. With GIS we can look at each individual store and see what the majority demographics are, the spending habits, what products they like, and the list goes on. Implementing this kind of GIS would help Costco stock the shelves with the popular products

and take the unpopular products off the shelves. It will avoid selling out of certain products or having an overstocked product. For example, there are certain products at a Costco that are staple at almost, if not every location such as the rotisserie chicken as well as the Kirkland Signature line of products. These would be the base building blocks that a Costco should have. From there they can stock the shelves with categories of products that the community leans towards such as organic, vegan, or green products. Another thing that Costco does is clothing. They will temporarily have a wide variety of clothing but it will only be seasonal. They can survey the local area to see if it is worth having the clothing options available all the time, seasonally, or not at all. This use of GIS should make Costco as efficient as possible with the way they stock their shelves. We also think that Costco should use the Collector app to further efficiency as well as track the hotspots and most bought products in-store.

The sources needed to find the data to pursue this kind of GIS implementation would be from the ArcGIS softwares. The two main programs would be the base ArcGIS and the Business Analyst platforms as well as Survey123. The supplementary applications would be the Dashboards and the Collector. The base ArcGIS provides countless base maps, layers, boundaries, the Living Atlas, which provides the most recent geographical data with apps, maps, and layers, etc. but by far the best function of these applications is that they are cloud-based so you can pull them up on any type of mobile technology or desktop. This allows for easy data transfers and idea sharing. The next application is Business Analyst which is the application we used the most in the project. This application is very similar to the base app but includes many other functions. For example, we used color-coded maps a lot to show the data that we would use. This made it very easy to visually identify areas that were more prone to the behavioral data that we chose. Let's say I am looking at a location like the Fontana Costco, with the color-coded map

it was very easy to see that they liked organic foods and spent a lot of money on various groceries but they didn't really like the green products nearly as much. That brings me to the next function that has a lot of use, the data finder. You can apply different real time data sets of up to five at a time to show almost any behavior. From eating organic foods to owning pets to money spent on various activities, this function is one of the most useful. The last major function we used was the drive times and rings to give an area within a reasonable distance from the Costco as well as pull data only from these areas. The next application will be Survey123 and the usefulness to Costco is pretty high. They can make an online survey that has some questions on what the customers shopping behaviors are and it could be as easy as putting a link on the receipts. Once people fill it out the data is compiled into many different graphs for easy to read results. Costco's could really benefit from this because they can see what the customer really wants, it would be direct feedback from the customer to the location that is issuing it. Our final source that Costco should use for data is Dashboards and the Collector app. The Collector app could track the behaviors of the customers in-store giving employees real time data. This could help Costco utilize placement of products to maximize sales while shopping as well as the exposure of the customer to new or unfamiliar products. Then Dashboards can be used to compile all the data from all of these applications for easy access and in an easy to read platform

For Costco's purposes, we recommend that the GIS and its data be organized into two separate parts. First off, the tapestry segmentations will be formatted on ArcGIS online maps along with a drive time layer. This will allow Costco to easily view each tapestry in relation to their geographical location to see where the segments fall regarding proximity to the store. Secondly, all results will be further refined into a Dashboard, to give Costco executives a more efficient layout of data collected for the purpose of making budget decisions. Organizing GIS

data in a dashboard is very beneficial for an organization because of how user friendly the platform is and how easily presentable relative data can be with it. This will make it feasible for a company like Costco to present the dashboard to people with no GIS experience, such as different members throughout the organization and even stockholders. In addition to the comprehensibility of dashboards, they are also very helpful and functional because of how immersive and interactive they are with the user. For example, you have the ability to move around the map, look at the layers, pop ups and so much more, which gives the viewer an even greater understanding of the data being presented.

Presentations are an integral part of decision making and problem solving within an organization. So for presentation purposes at Costco, such as monthly board meetings, stockholder presentations, and so forth, we think it would be best to have all the data and GIS features on a StoryMap. “A StoryMap is a widely accessible “vehicle” where learners benefit by having access to interactive, real-world models and data. The compactness of story maps is particularly appealing as they are effective for communicating and visualizing complicated ideas and large amounts of information.” This method of presentation would be the most ideal for Costco as they can display all maps in an organized manner and efficiently plan out a merchandising budget. Not only can they include maps, with StoryMaps Costco also has the ability to include features such as images, videos, and text to help make the presentation that much more thorough.

The first spatial analysis tool we are attempting to implement into Costco’s business operations comes in via the use of tapestry segmentations. Tapestry segmentation classifies neighborhoods into unique segments based on demographic and socioeconomic characteristics. It will also help Costco “understand customers' lifestyle choices, what they buy, and how they



spend their free time. Tapestry gives you insights to help you identify your best customers, optimal sites, and underserved markets. As a result, you will get higher response rates, avoid less profitable areas, and invest your resources more wisely.” Ultimately, the goal for tapestry segmentation is to provide Costco with advantageous insight into the kinds of consumers they have around a certain store location. With this insight Costco can make assumptions on the type of products their local consumers will be demanding and ultimately adapt their inventory to better appeal to customers. By meeting these specific consumer demands with the correct store supply Costco can maximize profits and limit costs with wasted inventory. In addition, the tapestry segmentations are a relatively simple and understandable spatial analysis tool. Which is helpful to management and other levels of the organization who are inexperienced with GIS, giving them a better opportunity to comprehend such important features.

Another spatial analysis method we think would be beneficial to implement would be data analysis performed via Business Analyst combined with the previous tapestry segmentation. The analysis conducted on Business Analyst will include maps displaying data on variables such as median income, spending habits on food, average spent per week at food stores, tech spending, and many other informative areas that could be helpful for Costco to know. “The choice for individual products is extremely limited at Costco in relation to other retailers. In fact, the company carries less than 4,000 items in an average store, compared to 80,000 at a typical Target or 150,000 at a Wal-Mart.” Therefore, to reach full potential with inventory limit it’s necessary Costco supplies the most in-demand products, which will vary from location to location. By including these analysis’ along with the tapestry segmentation, Costco can more accurately project the spending habits and gain a stronger image of their local customers. The way the data on the maps is displayed to explain the data relative to different locations gives

Costco a deeper understanding of certain areas and their tendencies. With this valuable information they can adapt their products and services to better appeal to the surrounding consumers. In addition, the data analysis performed on Business Analyst are rather easy to understand especially for inexperienced Costco crew members, as long as the most proper, perceivable symbology and layout is used.

The last spatial analysis tool we think Costco would benefit from utilizing is Survey123. “Surveys are a way to assess consumer needs that goes beyond the information collected through demographic, lifestyle of other secondary data sources.” By distributing this survey to a number of current Costco members, Costco can gain insight into their spending habits, product preference, and location. When gathered in a large enough amount alongside Business Analyst and ArcMap's data, Costco will have two accurate predictors of the wants and needs of local customers and can stock accordingly. By using Survey123 as another spatial analysis tool Costco can use the data recorded from it to strengthen other areas of study. “Findings from your consumer survey should be integrated with other elements of your market analysis. The results of your survey of consumers help shape other components of your research.” Having real-life consumer survey responses helps ensure tapestry segmentation and Business Analyst data are providing accurate representations of data which gives you a more well-rounded knowledge about local consumers.

While the cost of an ArcGIS license will be a large financial commitment for the company, being able to efficiently stock and sell items would greatly reduce the amount of overstock/product waste that the company would have. Being able to detect spending trends and income levels will also allow Costco to take advantage of shopping trends in the near future (e.g. The release of a new Apple product in an area where tech spending is above average.) One

important benefit that GIS could provide to Costco is highlighted in their 2020 annual report, which states “We may not timely identify or effectively respond to consumer trends, which could negatively affect our relationship with our members, the demand for our products and services, and our market share... Our success depends, in part, on our ability to identify and respond to trends in demographics and consumer preferences.” Costco recognizes here that they depend largely on finding demographic trends and patterns, which falls directly in line with data we gathered for our project. By setting different criteria for our maps in Business Analyst, our team was able to isolate and identify different patterns in customer preference and spending habits, as well as a number of other factors. This application would prove invaluable to predicting future customer behavior across a wide variety of market/economical conditions. Survey123, our other recommended application, grants Costco the ability to get specific data from customers while also providing their location data, which can then be used in a number of GIS softwares (ArcMaps, Business Analyst, ArcOnline, etc.).

Costco currently employs a sales tactic with one of their most popular products, the \$5 roasted chicken. By placing it in the back of the store, customers have to walk past multiple other products to reach it, which increases their likelihood of being purchased. In the same way, Costco would be able to further identify (and even predict) which products will be most popular and change the store layout to increase sales in the same way (items in entrance of store, back of store, near checkout, etc.). In one of our dashboard maps, “Fresh Ambitions” was the primary population tapestry, revealing that deals on affordable clothing are in demand for that site location. Once Costco is provided with this data, they could then switch marketing tactics to promote these specific items, and possibly find new distributors for clothing that offer better prices. Another way that Costco could utilize GIS data would be in establishing new store

locations through identifying potential customer locations.. This tactic of implementing GIS has been tested already by a small company known as Amari Studios, who based their new store locations off GIS data that identified their customer profiles/locations. The Amari group utilized census data via GIS technologies, their own customer data, and separate scholarly sources to create maps that “not only revealed an abundance of business potential within Amari Studios’ current service area but also identified some high potential areas located outside of the service area.” This study into GIS marketing shows that not only is our project, and GIS as a whole, applicable to Costco’s current marketing techniques, but also offers the advantage of establishing new locations and locating clusters of new customers. One important section of this article covers the weakness of this study, found when the Amari group had to use outdated census information due to the current year's information not being available yet. This concern is easily fixed however, thanks to the ease with which the data GIS software can be interchanged. This comes into play with the GIS technology used for Costco, as our group only identified three different site locations. While these specific maps cannot be used to study a different Costco location, the same parameters can easily be copied and applied to a new map, letting Costco use our site selection “method” on virtually any location in the US.

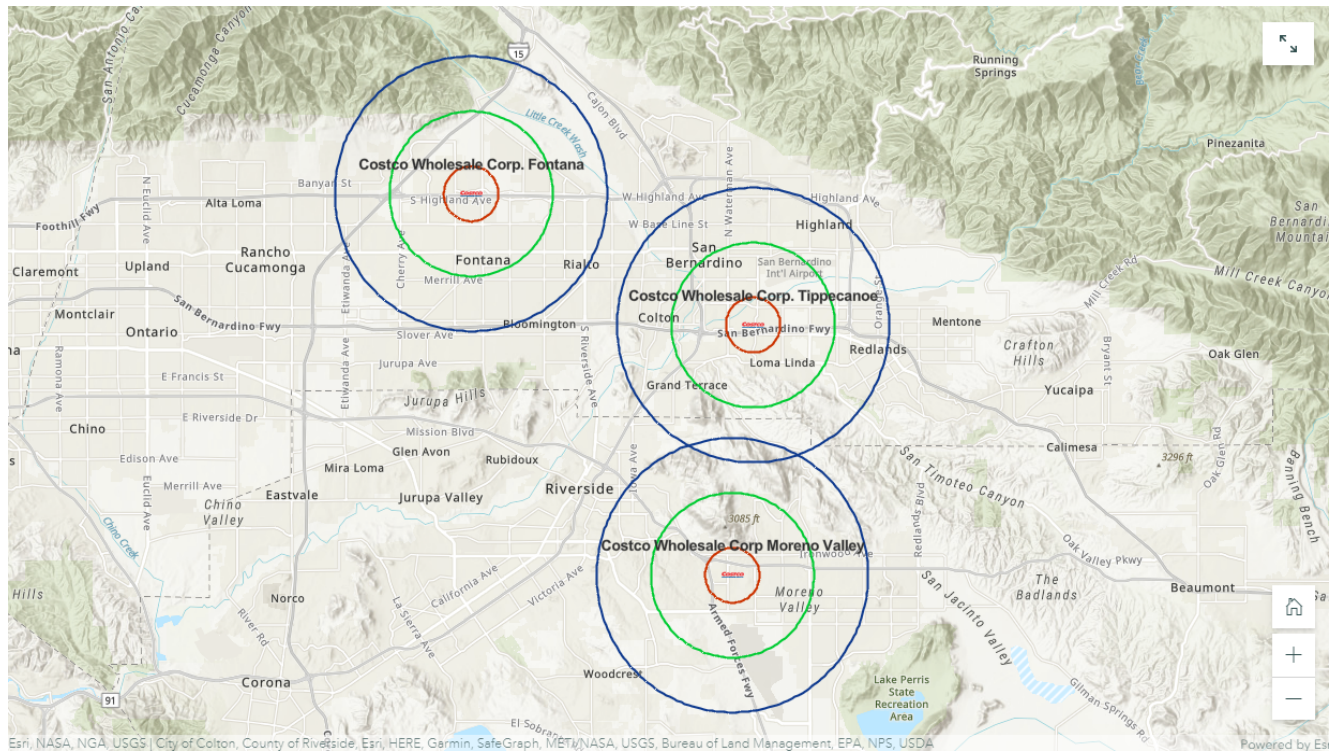
The implementation process is always a difficult thing because it is a new skill to learn and those who aren’t familiar can get discouraged. Luckily ArcGIS online is pretty user friendly and isn’t really hard to pick up. With that being said there are a few different routes that can be taken to train employees or key employees like the management team to be able to use the software effectively. If there is someone or multiple people that are adequate at using this software already then this would shorten up the process of training others to use it and explaining how to read the dashboards. The route that we expect the most is to have someone who is an

expert with GIS come in and train multiple people to be sufficient with the software or to outsource from a company that could do all the work but provide the different Costco's with all the data. If someone were to come in and teach there would be a course that Costco will provide for the employees, most likely will be paid for the hours spent in the course. After the course is completed they will most likely form small teams of the people who learned it to go to their Costco that they work at and teach another small team of people that are most likely upper management. This would allow every Costco to benefit and have people on the payroll that know how to use the software properly. These people will provide the Costco that they work at with the data collected from the customers and the nearby community. If the company were to outsource then they would need to hire a team of professionals to find the data for all Costco locations and an easy way to distribute the data out to the correct Costcos. This would more than likely cost the company more but Costco is such a large corporation that I don't see money being an issue at all. These are some of the options for implementation of the base applications and dashboards, Costco may also choose to have a Collector app made for them as well as a survey. If not these applications are also very user friendly and can be learned in a small amount of time.

## Citations

- Johnson, J. B. (2010). *Using GIS as a Marketing Decision Support System to Help Amari Studios Locate New Customers and Effectively Direct Marketing and Advertising Efforts*. Amari Studios.  
<http://www.gis.smumn.edu/GradProjects/JohnsonJB.pdf>.
- Costco Wholesale 2020 Annual Report*. Costco Wholesale Co. (2020, August 30).  
<https://investor.costco.com/static-files/7ef7bed6-c48f-4687-9c82-eb104b4823a5>.
- The Relationship Between GIS and Marketing*. USC GIS Online. (2021, February 10).  
<https://gis.usc.edu/blog/marketing-and-gis-relationship/>.
- Consumer Survey*. Downtown Market Analysis. (2011).  
<https://fyi.extension.wisc.edu/downtown-market-analysis/understanding-the-market/consumer-survey/>.
- Tapestry. (2016).  
<https://www.esri.com/en-us/arcgis/products/tapestry-segmentation/overview#:~:text=Understand%20customers'%20lifestyle%20choices%2C%20what,invest%20your%20resources%20more%20wisely>.
- Kalogeropoulos, D. (2015, April 26). Why Does Costco Have Less Merchandise On Its Shelves Than Other Retailers? The Motley Fool.  
<https://www.fool.com/investing/general/2015/04/26/why-does-costco-have-less-merchandise-on-its-shelv.aspx>.
- Developing and Evaluating an ESRI Story Map as an Educational Tool. (2018, July 19).  
<https://acsess.onlinelibrary.wiley.com/doi/epdf/10.4195/nse2018.04.0008>.

## Appendix



### All three Costco Focus Sites

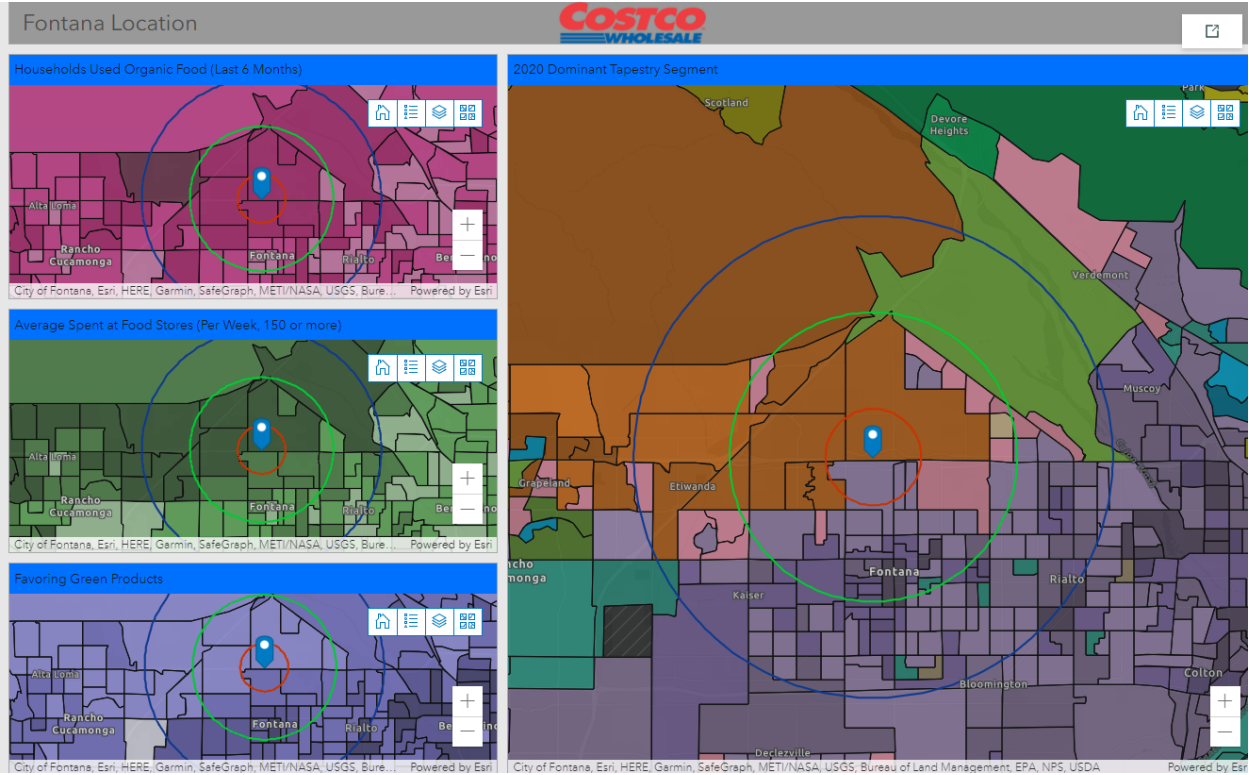
Fontana Site



16505 Sierra Lakes Pkwy, Fontana, CA 92336



Fontana Site Map



Fontana Site Dashboard

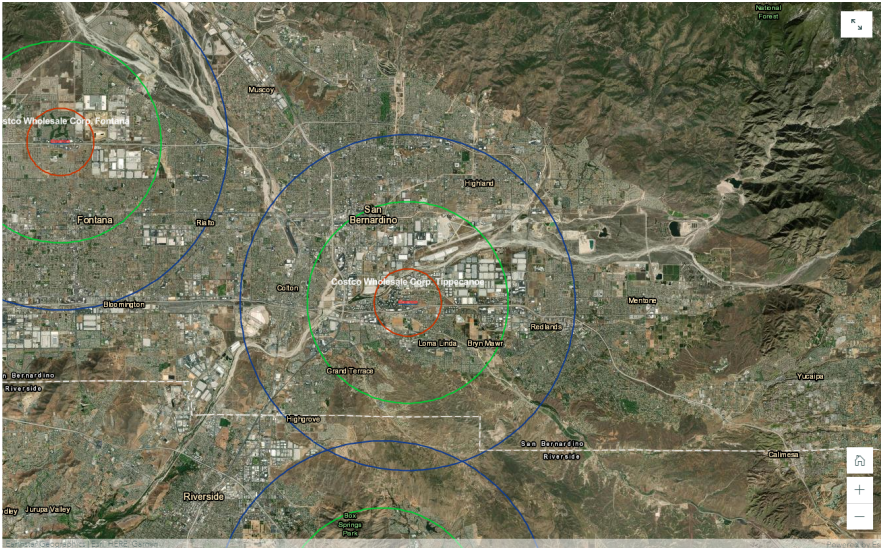


Redlands Site

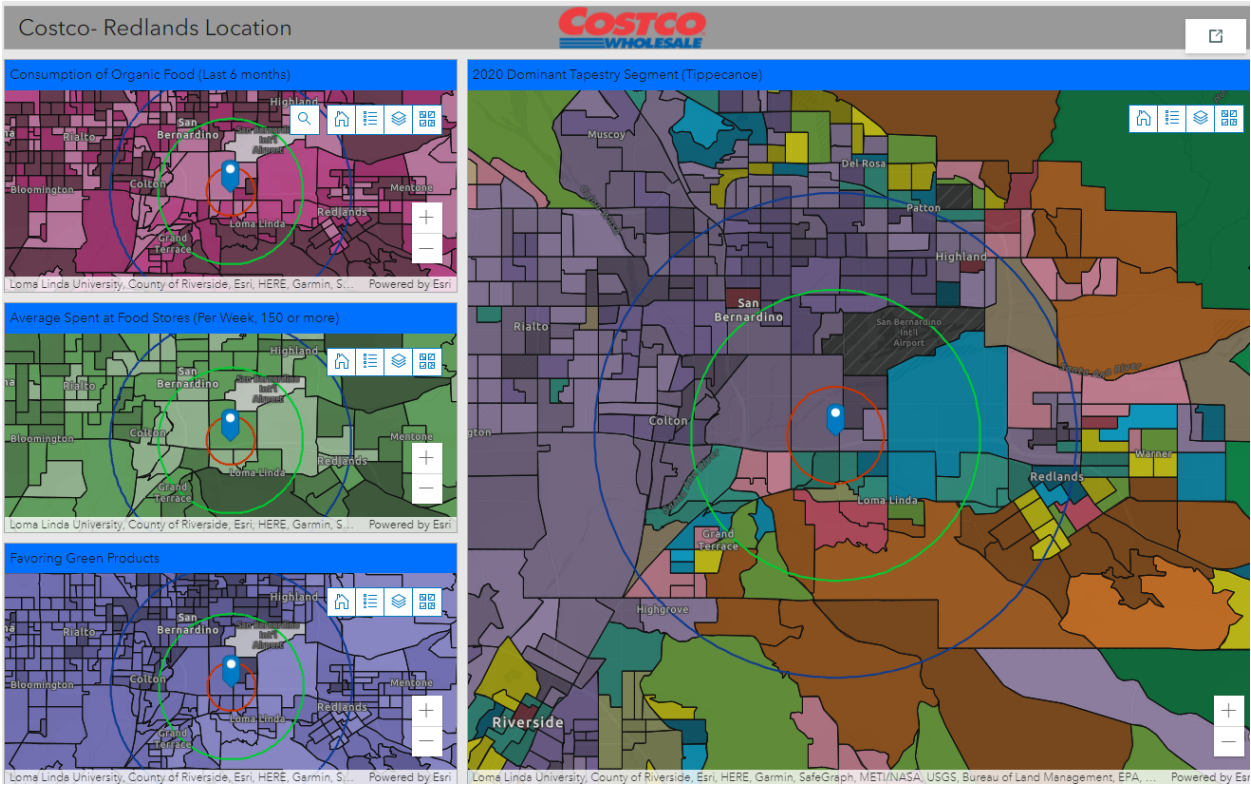


1099 E Hospitality Ln, San Bernardino, CA 92408

- 
- 
- 



Redlands Site Map



Redlands Site Dashboard

Moreno Valley Site

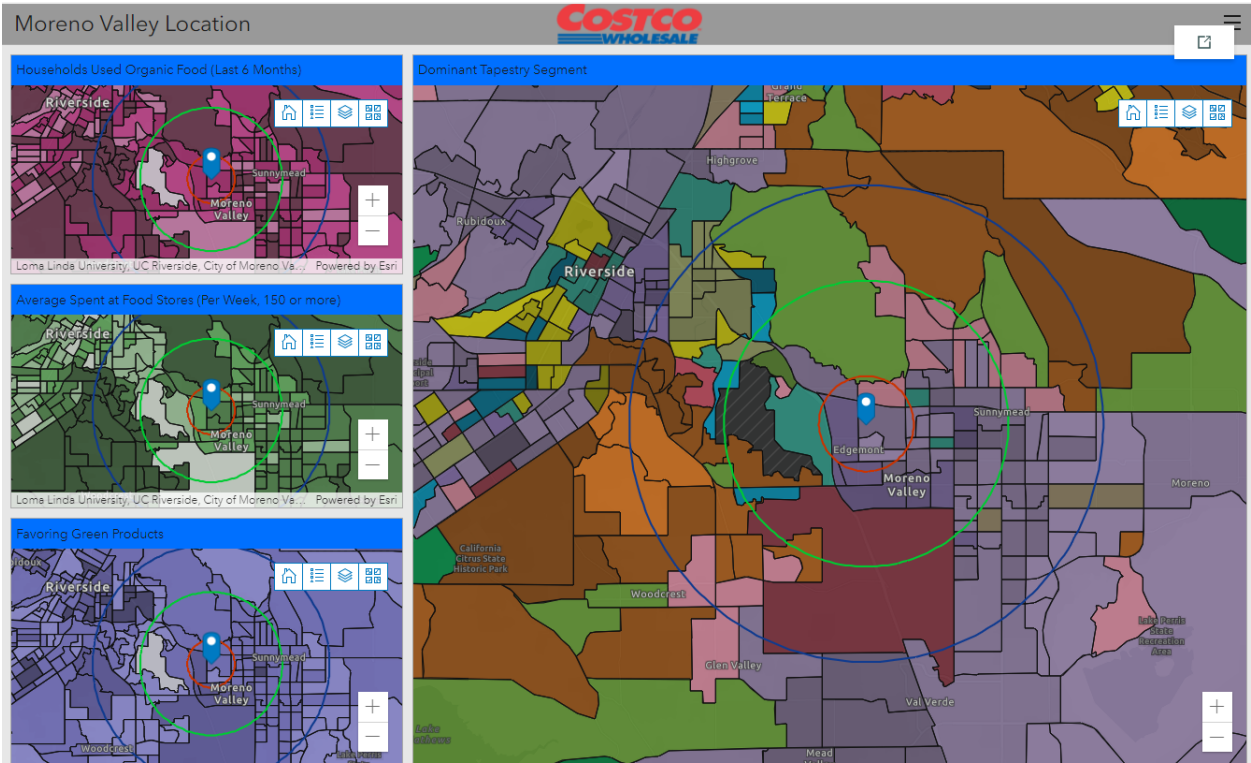


12700 Day St, Moreno Valley, CA 92553

- 
- 
- 



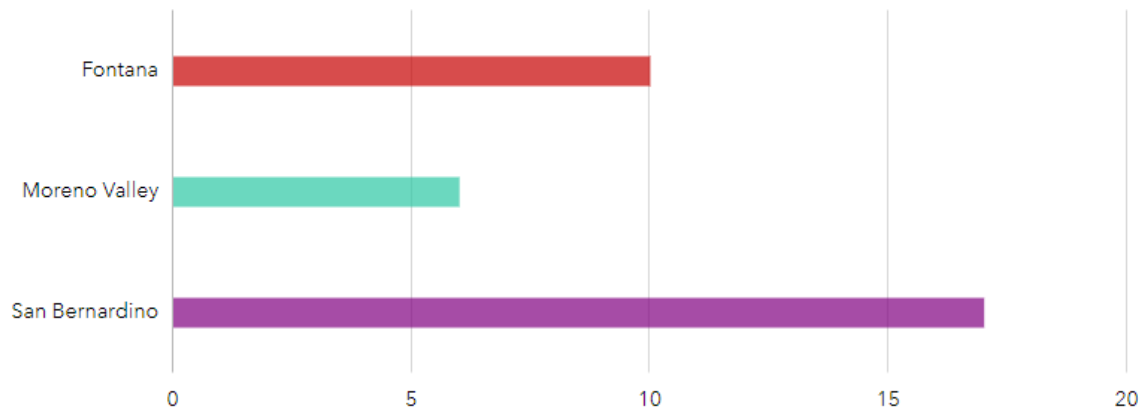
Moreno Valley Site Map



Moreno Valley Site Dashboard

What city is your preferred Costco located in?

Column Bar Pie Map



[Hide table](#)

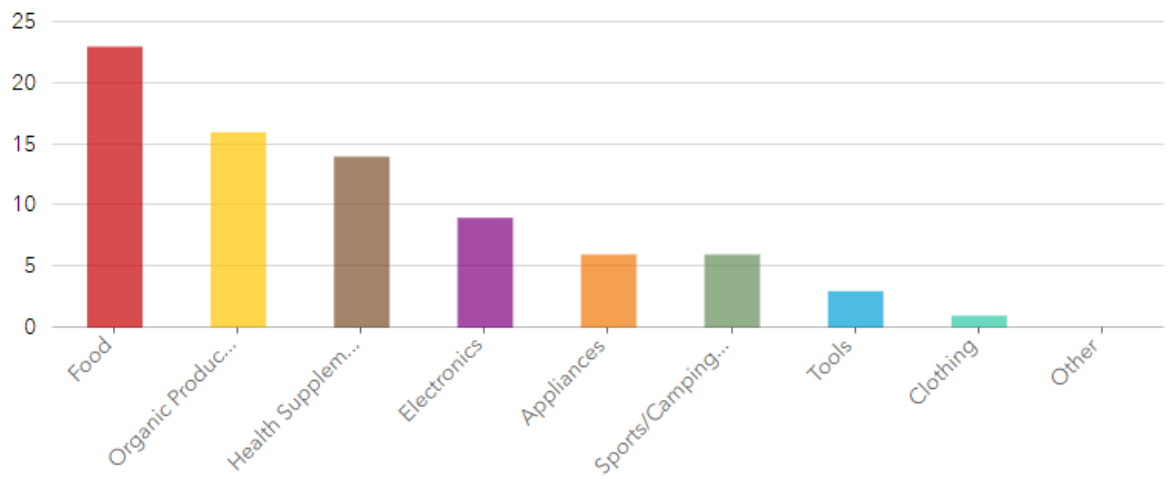
☒ Empty categories [↑↓ Sort](#)

Answers	Count	Percentage
Fontana	10	30.3%
Moreno Valley	6	18.18%
San Bernardino	17	51.52%

Answered: 33 Skipped: 0

Would you consider Costco your primary, or go-to, store for any of the following products? \*

Column Bar




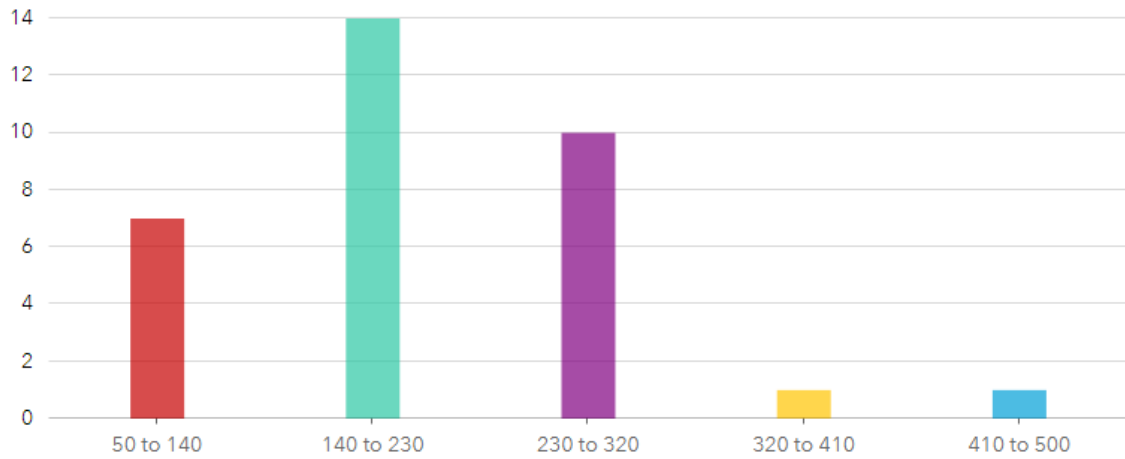
[Hide table](#)

Other response ☒ Empty categories Sort

Answers	Count	Percentage
Food	23	69.7%
Organic Produce	16	48.48%
Health Supplements	14	42.42%
Electronics	9	27.27%
Appliances	6	18.18%
Sports/Camping Gear	6	18.18%
Tools	3	9.09%
Clothing	1	3.03%

How much, on average, does your household spend at Costco monthly? \*

Column Bar Pie Map 



[Hide table](#)

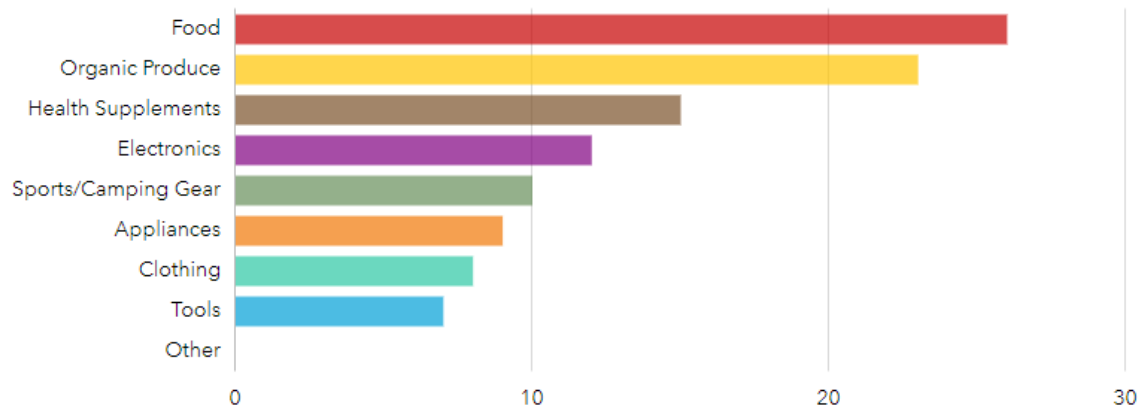
☒ Empty categories  Sort

Stats	Value
Min.	50
Max.	500
Avg.	208.090909090909
Sum.	6,867

Answered: 33 Skipped: 0

What are some of your favorite items to purchase? \*

Column Bar



[Hide table](#)

☐ Other response ☒ Empty categories

Answers	Count	Percentage
Food	26	78.79%
Organic Produce	23	69.7%
Health Supplements	15	45.45%
Electronics	12	36.36%
Sports/Camping Gear	10	30.3%
Appliances	9	27.27%
Clothing	8	24.24%
Tools	7	21.21%