Data-Driven Approach to Optimize Starbucks Operations and Customer Experience

Linu Anil (x23183853)
MSc. Data Analytics
National Collage of Ireland
Dublin, Ireland
x23183853@student,ncirl.ie

Donnal Benzon (x23216531)
MSc. Data Analytics
National Collage of Ireland
Dublin, Ireland
x23216531@student,ncirl.ie

Arun Joy (x23174994)
MSc. Data Analytics
National Collage of Ireland
Dublin, Ireland
x23174994@student,ncirl.ie

Video Presentation Link: https://studentncirl-my.sharepoint.com/:v:/r/personal/x23183853_student_ncirl_ie/Documents/Microsoft%20Teams%20Chat%20Files/1715892686260757.mp4?csf=1&web=1&e=fWdfeK&nav=eyJyZWZlcnJhbEluZm8iOnsicmVmZXJyYWxBcHAiOiJTdHJlYW1XZWJBcHAiLCJyZWZlcnJhbFZpZXciOiJTaGFyZURpYWxvZy1MaW5rIiwicmVmZXJyYWxBcHBQbGF0Zm9ybSI6IldlYiIsInJlZmVycmFsTW9kZSI6InZpZXcifX0%3D

(a) Background Information

The Starbucks Company is the leading coffeehouse chain and the retail coffee industry, and also it is the global market player. The shop provides a rich choice of coffee and tea as well as a great number of food snacks, attracting people of different tastes. Being global company in scale of over 30,000 locations, Starbucks establishes contact with millions of customers worldwide, thus generating enormous amount of information about customers and transactions. Such data is the source of the company's business operations, from customer experience to effective supply chain. Starbucks is operating on a complex global supply chain that constantly ranges from bean farming to product design and complex logistics of its retail operations. The scope of the project encompasses several critical processes: customer relationship management (CRM) also includes sales and marketing analytics, supply chain optimization, inventory management, and financial reporting. These areas are key factors for the organization to upgrade the efficiency of the operations, to uplift and satisfy our customers, and to obtain the opportunity to stay at No.1 in the market (Aminuddin et al. 2021).

(b) System Design

Data Capture Points

Starbucks uses a multi-instance approach of data collection and management that covers several aspects of its operations to guarantee the highest degree of operational efficiency and customer satisfaction. Engaging in consumer trade is the core function of POS Systems that accurately record every transaction and analyze client purchases behavior, showing the retailers the customers' buying volume on a daily basis. Along with its brick and mortar presence, the digital

platforms developed by Starbucks include the Mobile App and Website. The latter platforms, apart from online order placing, also gather data like app usage, preferences and loyalty program interactions, enabling the company to have deep insights into digital consumer behavior. Regarding the supply chain side, Starbucks employ the most developed Supply Chain Systems for collecting data related to suppliers, keeping the optimal levels of the inventory, tracking the shipments, and monitoring logistics costs in real-time, which maintains a smooth flow of cargo from suppliers to stores (Turner, Weickgenannt and Copeland,2022). These systems hold the key in improving workforce efficiency through functions such as staff scheduling, performance metrics evaluating and labor costs control. All these systems together allow Starbucks to work with high reliability and ensure that the company is always ready to seize market opportunities.

Analytics Requirements

Starbucks utilizes sophisticated analytics to examine customer behavior closely, and this provides useful information on patterns and frequencies of purchase, customers' preferences, as well as the efficiency of its loyalty program. Such analysis helps in building product and service packages that cater to the needs of the customers and also expands the customer engagement. Moreover, the company conducts deep evaluations of sales and marketing results by gathering the effect of campaigns, analyzing seasonal fluctuations, and reaching to the individual product performance. This integrated strategy is the enabler for Starbucks to advance its marketing efforts and improve its product line. Regarding the logistics processes, the company implements the strategy of inventory management efficiency to eliminate wastage, thus enhancing delivery time of products. This way, products consistently meet the market demand. Another important area for Starbucks should be the financial health. Here come the real time dashboards which provide the visibility and the analysis of key financial metrics, cost management, and profitability all at a time. These dashboards constitute a vital tool kit for the decision makers because they provide a basis for strategic planning and financial management which preserves the competitive edge and the stability of the company through time (Fader , 2020; Ward et al. 2023).

Integrating Customers

CRM data that Starbucks uses helps them to give individualized marketing and offer services which are in accordance to the individual customer preferences to increase the engagement level. Aside from that, through the mobile app and website, customers can reach the company feedback system by submitting, analyzing or collecting their opinion. Extensive use of such tactics

allows the Starbucks to gain more experience and thus Starbucks knows the customer's requirements and expectations at all times.

(c) Database Design

Entity-Relationship Diagram (ERD)

The Entity-Relationship (ER) diagram, which is a visual representation of the data structure for a database concerning cities and related information. At the center is the "City" entity, which holds information about each city, identified by a unique "CityID", along with "CityName" and "County". Two one-to-one relationships extend from the "City" entity: one to the "Demographic" entity and one to the "Starbucks" entity, indicating that for each city, there is a corresponding set of demographic data and data regarding Starbucks locations within the city. The "Demographic" entity contains attributes like median age, median household income, population from the 2010 census, percentage of the white population, and land area, all providing detailed demographic profiles for each city. The "Starbucks" entity includes the number of Starbucks, the number of Starbucks per million inhabitants, and Starbucks per 10 square miles, giving a sense of Starbucks' presence in each city. there is the "Rankings" entity, which appears to rank cities based on the number of Starbucks per capita, area, median age, median household income, and white population percentage,

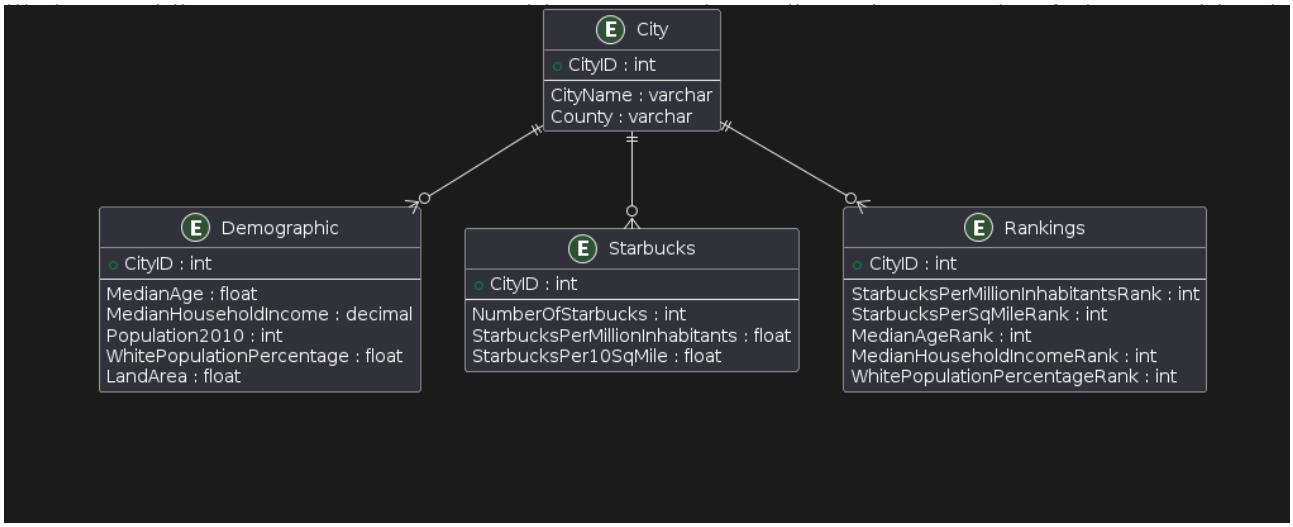


Fig 1: Entity-Relationship Diagram

Proposed Data Structures

The database schema for analyzing Starbucks' footprint in California cities is composed of four interconnected tables: The City Table is the starter, which is the identifier of each city that is indicated by its 'CityID' and which also provides the city's name and related county. The Demographic Table is related to the City Table through the 'CityID' and shows the median age, household income, population figures for the year 2010, white population percentage as well as the land area of the city. The operational data pertaining to Starbucks is kept in the Starbucks Table, which contains the number of Starbucks outlets, their density in every 1 million inhabitants, and every 10 square miles, and heavily connected to the city. Lastly, the Rankings Table ranks cities on a scale of 10 according to Starbucks density, age, and income, white population percentage, which shows demographic and business metrics in a hierarchical way that is instrumental for strategic analysis and planning.

Business rules

The Starbucks' presence in California is multi-faceted and the schema is delineated into four inter-related tables with dimensions. The City Table stands for a basis, with a 'CityID' used as a unique identifier for each record and other attributes such as 'City Name' and 'County' described further. This is a table, which is a part of the relational model and the 'CityID' is a reference point for other tables in the subsequent table. The Socioeconomic Table brings the demographic picture of each city to live. It is called as "CityID" to maintain correlation and covers essential demographics as the median age, the average household income in 2010, the total population, the proportion of the white population, and the city's land area. The Table Starbucks will expand its scope by incorporating the operational metrics data in this locality. The 'CityID' connects to the City Table making the connection. Key operational metrics made include outlets, stores per million inhabitants and spatial metric representing store density per 10 square miles. The analytical feature of the schema is reflected in the Rankings Table. The table contains the city ranking metrics, each ranked directly by its 'CityID'. These rankings measure the full gamut from Starbucks' density indicators (both per capita and per square mile), to demographic rankings (average age and median income), and to socio-demographic indicators for the percentage of the white population. On the other hand, the integration of the business rules into this schema is going to result in a strong structure for data integrity and a system workflow complex. The business rules require all primary identifiers to be unique and non-null. These fundamental rules set up a solid foundation for data integrity. Checks are inserted to verify the legitimacy of data upon input with some numbers leading to logical limits,

financial figures are positive and formatted in a fixed manner. Workflows are intended to be the mechanisms that automatically check the integrity of inter-table data consistency: such as updating per-capita statistics after demographic changes, as well as recomputing the rankings in response to new data. It enables the company to conduct analytics with complete confidence in the integrity and reactivity to the dynamic market situation where Starbucks operates. Implementation Report Summary.

Development Process and Architecture

The process was governed by a well-defined methodology and an architecture was designed from the ground up that was very reliable. This architecture incorporates a centralized database, and also accepts data from multiple points of capture. These points can be from both retail and digital interface. Real time analytics and data collection are enabled.

Control and Operation Effectiveness and Efficiency

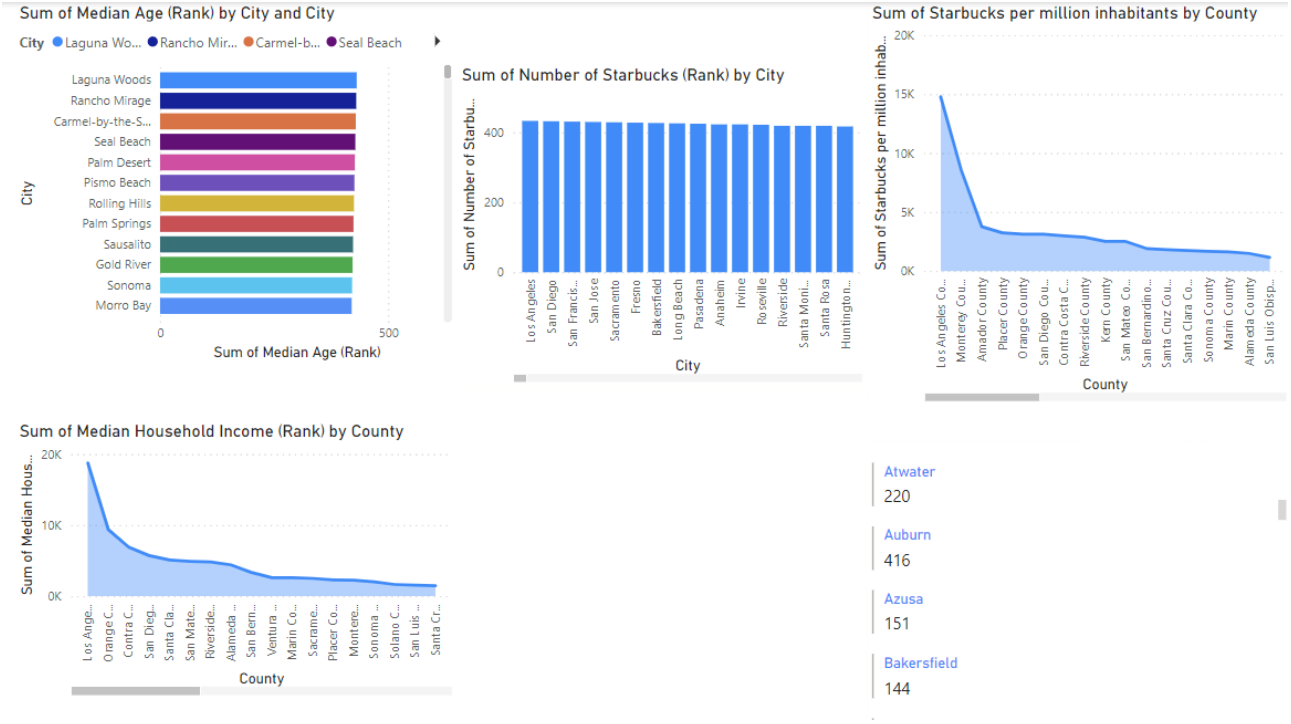
The embedded process control functions consist of validation rules for data validation, workflows algorithms for data updates and mechanisms for real-time analytics. These features have become a critical component of Starbucks' data flow, ensuring high operational efficiency and accuracy across the system's data.

Benefits Realized from the Solution

The execution of the solution is characterized by a simple to navigate interface that has made the entire process to be efficient and thus have led to better customer relationship management, supply chain optimization, and financial reporting and inventory management. These improvements together have, among other benefits, contributed to more decision-making processes with better outcomes and increased effectiveness in operations.

System Features and Data Management

The system has secure objects and access controls for data security, user-defined fields and field sets specifically designed for Starbucks' particular data points, linked relationships and layouts for structured data representation, and validation rules and record types as data validation and integrity mechanisms. Such features, showcased through attached screenshots, highlight how they are applicable and efficient in real life.



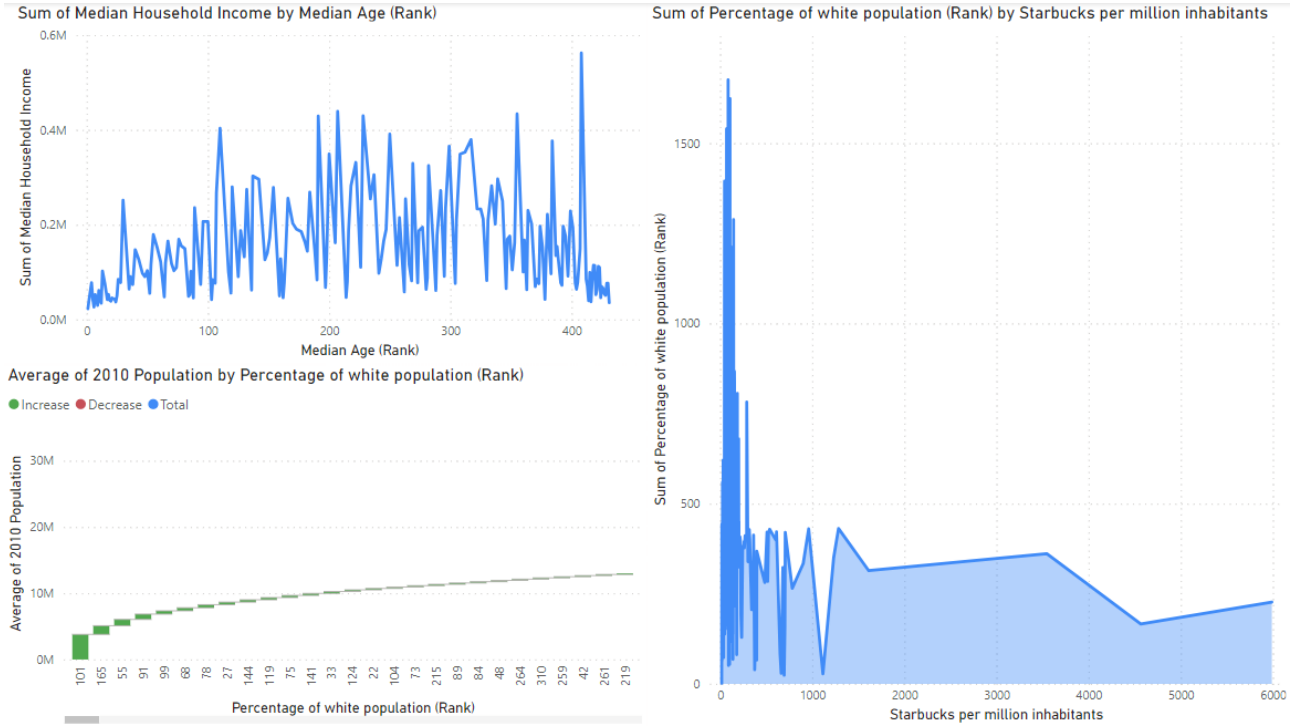
Analytical Tools: Reports and Dashboard

Dashboard 1:

Fig 2: DASHBOARD 1

This dashboard shows comprehensive list of the highlighted graphs and bar charts from different places with the data probably from the database you looked at before. The first graph draws an inference from the fact that cities like Laguna Woods and Rancho Mirage appear at the top of the list of cities based on median age, which hints that they may have an older population. The second chart delineates the quantity of branches on the basis of cities in which the most number of Starbucks resides. The third is the line graph of the number of Starbucks per 10 square miles by county and the line is steeply downward after the first a few counties, hence this indicates the major gap between urban and rural area in terms of the access to Starbucks. The last graph displays the fact that the median household income is the lowest in those counties that have the highest scores. Last, there is a searchable table, marking counties such as Adelanto and Agoura hills and their rankings in median household income. This dashboard provides the mechanism to analyze and

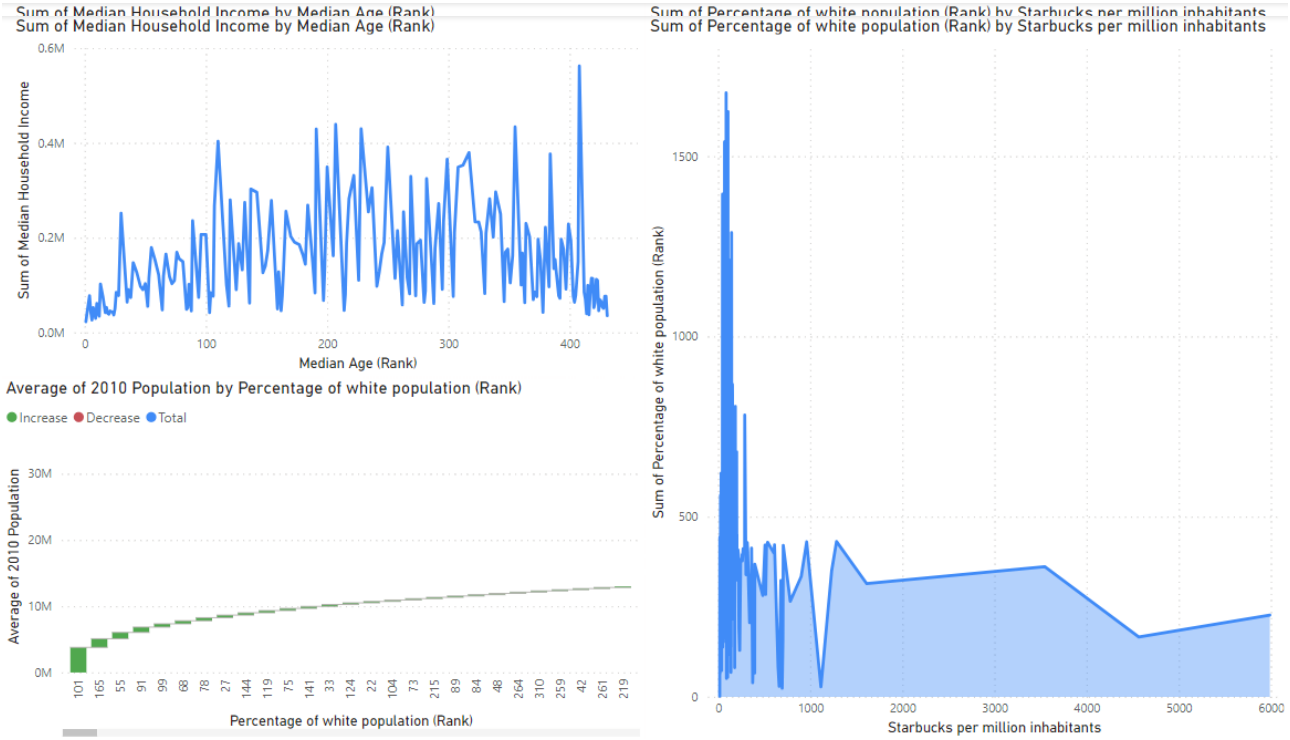
compare between demographic and economic indicators among cities and counties, and it is likely to be beneficial for market research or urban planning.



Dashboard 2:

Fig 3: DASHBOARD 2

The dashboard includes three different charts that represent demographic and economic data. The first chart illustrates the amount of household income where it is presented as the sum of median household income against the household income median age rank, and there are notable differences within age groups. The second graph is a scatter plot depicting the appearance of the average 2010 population as the percent of white population rank higher. The third chart is a hybrid bar and line graph, which portrays the total percentage of the white population rank against the number of Starbucks outlets per million inhabitants, and it gives the impression of a higher ranking of Starbucks outlets in regions with a larger white population. Charts taken all together might be suggesting correlations between age, income, ethnic groups, and the distribution of commercial establishments of Starbucks.



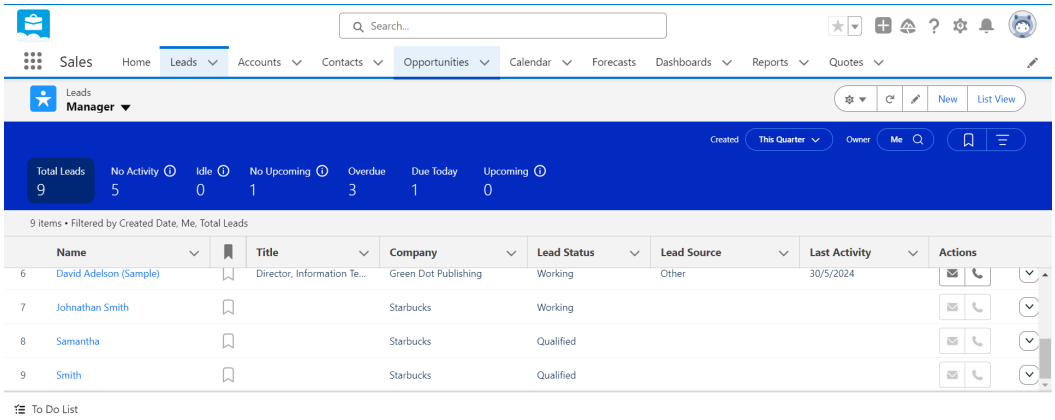
Dashboard 3:

Fig 4: DASHBOARD 3

This dashboard contains three charts which are based on the location of Starbucks against the socioeconomic and demographic characteristics. The first graph corresponds to the average number of Starbucks with median household income, without evident pattern that brings the conclusion of a complex relationship. The next graph is about the total number of Starbucks per 10 square miles and median age. It shows the peaks that are not always predictable and can be used to show the lack of pattern. The following graph gives the sum of Starbucks store numbers per square mile with the area, showing that there are a large number of stores in smaller areas and the number of stores starts reducing as the size of the area increases, thus urban areas might have more Starbucks stores.

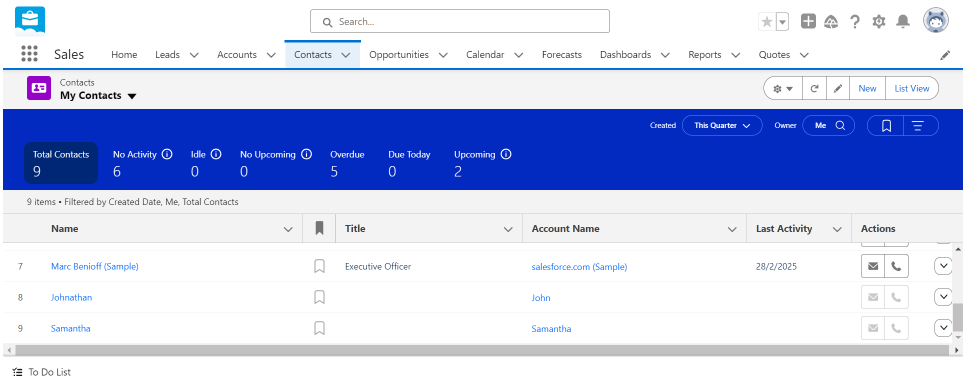
Salesforce

Lead



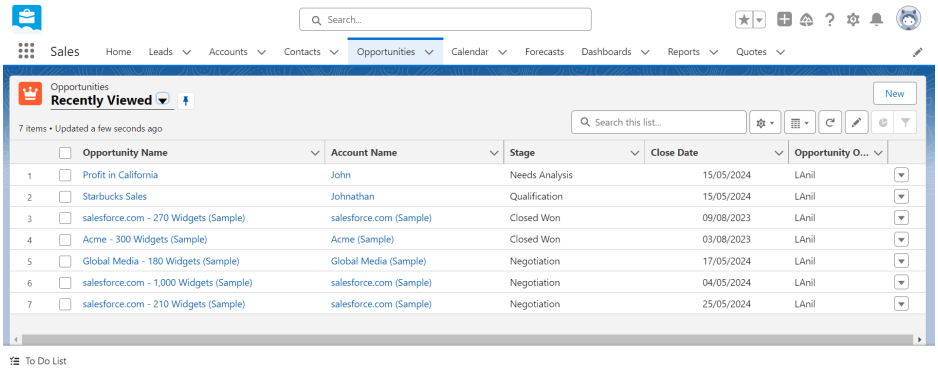
The Leads view in Salesforce is a dashboard that is designed for the management of sales leads, a crucial element for any business, even in a hypothetical Starbucks situation. This screen gives a complete picture of all leads, arranged by different stages and activities like "No Activity", "Idle", "No Upcoming Overdue", and "Due Today". Every lead is noted with details such as name, title, company, lead status, and source, plus the date of last activity, which is crucial for the timely follow-ups. This interface enables users to rapidly check the status of leads and thus, to prioritize the outreach activities smoothly.

Contacts



In the Contacts view, the users manage their connections within a company, like Starbucks, keeping the individual contact details and their associated accounts. This screen gives a concise overview of all contacts, which are classified into categories like "No Activity", "Overdue", and "Due Today". Every contact entry has the name, title, account name, and the date of the last activity which is used by the users to keep in touch and nurture the relationships that are necessary for the successful business operations.

Opportunities



The Opportunities perspective is about monitoring and handling sales opportunities, which are vital for the revenue generation in cases like a Starbucks market analysis. This interface shows a list of opportunities, which includes the opportunity name, the account name, the stage of negotiation, and the expected close date. The systematic information allows the sales teams in Starbucks to keep track of the progress, foresee the needs, and the sales process to be strategically driven to close the deals in an effective manner.

Conclusive Thoughts

The report is concluded with a summation of the project's correspondence to the strategic requirements of Starbucks, lessons learned, and suggestions for further systems optimization. The report is two roles: the first one being a record of the project's development while the other role is that of a manual in using the system which is crucial in the company's progression.

Dataset link:

https://data.world/alice-c/starbucks

References:

Ward, A.F., Marmol, M., Lopez-Lopez, D., Carracedo, P. and Juan, A.A., 2023. Data analytics and artificial intelligence in e-marketing: techniques, best practices and trends. *International Journal of Data Analysis Techniques and Strategies*, *15*(3), pp.147-178.