

Analyzing Amazon Consumer Behavior Survey Data using Power BI

Introduction

Among the many applications of data analytics, I have always been intrigued to crunch consumer market data. Understanding consumer preferences and accordingly, their behavior is something that I am curious about.

While hunting for relevant datasets online to explore this domain, I came across the **Amazon Consumer Behaviour Dataset** on Kaggle which caught my attention. To me, what stood out about this dataset was the level of intricacy and specificity that was recorded by the conducted survey.

The inclusion of metrics like preferred product search methods, cart abandonment factors, dependency on reviews and ratings while purchasing products, etc. were some interesting areas for exploration. Of course, I hand-picked the ones that I deemed to be impactful.

This portfolio project allowed me to break down a survey conducted on a set of Amazon's customers to get insights into their purchasing patterns and their overall satisfaction levels with Amazon by different demographic elements.

Data Cleaning and Preparation

Even though the dataset contained various fascinating fields, I still had to indulge in a good amount of data cleaning, transformation and preparation before I could use it for analysis and visualization.

Some of the important steps I conducted were the following:

- **Creating a data dictionary:** The first step was to clearly and accurately understand what each field/column represented. And also, to get a preliminary assessment of the more important variables for the analysis.

| Column Name | Description | Category |
|-----------------------------|--|--------------------------------|
| Age | Age of the survey respondent. | Slicers |
| Gender | Gender of the survey respondent. | Slicers |
| Purchase_Frequency | Frequency of purchases made on Amazon by the respondent. | Useful Columns/Variables |
| Purchase_Categories | Product categories typically purchased by the respondent on Amazon. | Useful Columns/Variables |
| Browsing_Frequency | How often the respondent browses Amazon's website or app. | Not useful/Redundant Variables |
| Product_Search_Method | Method used by the respondent to search for products on Amazon. | Not useful/Redundant Variables |
| Search_Result_Exploration | Whether the respondent tends to explore multiple pages of search results or focus on the first page. | Not useful/Redundant Variables |
| Customer_Reviews_Importance | Importance of customer reviews in the respondent's decision-making process. | Not useful/Redundant Variables |
| Add_to_Cart_Browsing | Whether the respondent adds products to the cart while browsing on Amazon. | Not useful/Redundant Variables |
| Cart_Completion_Frequency | Frequency of completing the purchase after adding products to the cart. | Not useful/Redundant Variables |
| Cart_Abandonment_Factors | Factors that influence the respondent's decision to abandon a purchase in the cart. | Not useful/Redundant Variables |
| Saveforlater_Frequency | Usage frequency of Amazon's "Save for Later" feature by the respondent. | Not useful/Redundant Variables |
| Review_Left | Whether the respondent has ever left a product review on Amazon. | Not useful/Redundant Variables |
| Review_Reliability | Reliance on product reviews when making a purchase, as perceived by the respondent. | Not useful/Redundant Variables |
| Review_Helpfulness | Whether the respondent finds helpful information from other customers' reviews. | Not useful/Redundant Variables |
| Recommendation_Helpfulness | Whether the respondent finds the personalized recommendations helpful. | Not useful/Redundant Variables |
| Rating_Accuracy | Rating given by the respondent for the relevance and accuracy of the recommendations received. | Not useful/Redundant Variables |
| Shopping_Satisfaction | Level of satisfaction with the overall shopping experience on Amazon. | Not useful/Redundant Variables |
| Service_Appreciation | Aspects of Amazon's services that the respondent appreciates the most. | Not useful/Redundant Variables |
| Improvement_Areas | Areas where the respondent thinks Amazon can improve. | Not useful/Redundant Variables |

Within the dictionary, I identified and classified the fields into different categories: the ones highlighted in **yellow** were to be used as **slicers** (a tool that helps you pick and show only the data you need in a report by selecting options from a list), the one highlighted in **green** were **useful columns** to be used for analysis, and the ones highlighted in **red** would be **discarded or not considered** for analysis.

This of course was done at a preliminary stage to identify meaningful analytics questions while eliminating the extra fat.

The creation of a data dictionary also contributed to documentation. Documentation is an underrated practice which is immensely useful for bigger projects with multiple stakeholders involved.

- Using Power Query Editor for data transformation:

This is how the data looked originally

Amazon Customer Behaviour Survey - Power BI Project - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Source Recent Data Data source settings Data Sources Manage Parameters Refresh Preview Properties Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Sort Split Column Group By Data Type: Text Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Combine Text Analytics Vision Azure Machine Learning AI Insights

Queries [1] Amazon Customer Beha...

| | Column1 | Column2 | Column3 | Column4 | Column5 |
|----|--------------------------------|---------|-------------------|------------------------|--|
| 1 | Timestamp | age | Gender | Purchase_Frequency | Purchase_Categories |
| 2 | 2023/06/04 1:28:19 PM GMT+5:30 | 23 | Female | Few times a month | Beauty and Personal Care |
| 3 | 2023/06/04 2:30:44 PM GMT+5:30 | 23 | Female | Once a month | Clothing and Fashion |
| 4 | 2023/06/04 5:04:56 PM GMT+5:30 | 24 | Prefer not to say | Few times a month | Groceries and Gourmet Food;Clothing and Fashion |
| 5 | 2023/06/04 5:13:00 PM GMT+5:30 | 24 | Female | Once a month | Beauty and Personal Care;Clothing and Fashion;others |
| 6 | 2023/06/04 5:28:06 PM GMT+5:30 | 22 | Female | Less than once a month | Beauty and Personal Care;Clothing and Fashion |
| 7 | 2023/06/04 6:01:59 PM GMT+5:30 | 21 | Female | Less than once a month | Clothing and Fashion |
| 8 | 2023/06/04 6:31:41 PM GMT+5:30 | 22 | Female | Less than once a month | Clothing and Fashion |
| 9 | 2023/06/04 7:13:12 PM GMT+5:30 | 21 | Female | Few times a month | Beauty and Personal Care;Clothing and Fashion |
| 10 | 2023/06/04 7:23:21 PM GMT+5:30 | 20 | Female | Less than once a month | Beauty and Personal Care;Clothing and Fashion |
| 11 | 2023/06/04 7:33:12 PM GMT+5:30 | 23 | Female | Less than once a month | Beauty and Personal Care;Clothing and Fashion |
| 12 | 2023/06/04 7:45:33 PM GMT+5:30 | 22 | Female | Less than once a month | Clothing and Fashion |
| 13 | 2023/06/04 7:48:31 PM GMT+5:30 | 25 | Female | Multiple times a week | Beauty and Personal Care;Clothing and Fashion;Home and Kitchen |
| 14 | 2023/06/04 8:00:11 PM GMT+5:30 | 23 | Female | Less than once a month | Beauty and Personal Care;Clothing and Fashion |
| 15 | 2023/06/04 8:01:45 PM GMT+5:30 | 24 | Female | Once a month | Clothing and Fashion;Home and Kitchen |
| 16 | 2023/06/04 8:02:28 PM GMT+5:30 | 21 | Female | Less than once a month | Beauty and Personal Care |
| 17 | 2023/06/04 8:20:42 PM GMT+5:30 | 23 | Female | Less than once a month | others |
| 18 | 2023/06/04 8:39:53 PM GMT+5:30 | 16 | Male | Few times a month | Clothing and Fashion;others |
| 19 | 2023/06/04 8:45:45 PM GMT+5:30 | 21 | Female | Less than once a month | Clothing and Fashion |
| 20 | 2023/06/04 8:46:02 PM GMT+5:30 | 23 | Female | Few times a month | Beauty and Personal Care;Home and Kitchen |
| 21 | 2023/06/04 8:48:59 PM GMT+5:30 | 25 | Female | Less than once a month | Beauty and Personal Care |
| 22 | 2023/06/04 8:49:49 PM GMT+5:30 | 64 | Male | Once a week | Groceries and Gourmet Food |
| 23 | 2023/06/04 8:52:49 PM GMT+5:30 | 23 | Female | Once a month | Clothing and Fashion |
| 24 | 2023/06/04 8:54:36 PM GMT+5:30 | 21 | Male | Less than once a month | others |
| 25 | 2023/06/04 9:10:08 PM GMT+5:30 | 16 | Female | Less than once a month | Clothing and Fashion |
| 26 | 2023/06/04 9:10:51 PM GMT+5:30 | 23 | Female | Few times a month | Beauty and Personal Care;Clothing and Fashion;others |
| 27 | 2023/06/04 9:18:12 PM GMT+5:30 | 24 | Female | Multiple times a week | Groceries and Gourmet Food |
| 28 | 2023/06/04 9:22:58 PM GMT+5:30 | 22 | Female | Less than once a month | Beauty and Personal Care;Clothing and Fashion |
| 29 | 2023/06/04 9:29:59 PM GMT+5:30 | 23 | Female | Less than once a month | Beauty and Personal Care |
| 30 | | | | | |

23 COLUMNS, 603 ROWS Column profiling based on top 1000 rows

PREVIEW DOWNLOADED AT 4:59 PM

Query Settings

NAME Amazon Customer Behavior Survey

ALL PROPERTIES

APPLIED STEPS

- Source
- Promoted Headers
- Added Index
- Reordered Columns3
- Changed Type
- Renamed Columns
- Extracted Text Before Delim...
- Changed Type1
- Renamed Columns1
- Filtered Rows
- Split Column by Delimiter
- Changed Type2
- Reordered Columns2
- Unpivoted Columns
- Added Index1
- Reordered Columns4
- Removed Columns3
- Removed Columns
- Renamed Columns2
- Reordered Columns
- Filtered Rows1
- Capitalized Each Word
- Filtered Rows2
- Removed Columns1
- Capitalized Each Word1

And this is how it looked post all the transformations were applied:

Amazon Customer Behaviour Survey - Power BI Project - Power Query Editor

File Home Transform Add Column View Tools Help

Close & Apply New Source Recent Sources Enter Data Data source settings Manage Parameters Refresh Preview Properties Advanced Editor Choose Columns Remove Columns Keep Rows Remove Rows Split Column Group By Data Type: Whole Number Use First Row as Headers Replace Values Merge Queries Append Queries Combine Files Text Analytics Vision Azure Machine Learning

Queries [1] Table.ReplaceValue(#Replaced Value7,"User-friendly website/app interface","User-friendly interface",Replacer.ReplaceValue,

| | Index | Age | Gender | Purchase_Frequency | Purchase_Categories | Browsing_Frequency | Product |
|----|-------|-----|-------------------|------------------------|----------------------------|--------------------|------------|
| 1 | 1 | 23 | Female | Few times a month | Beauty And Personal Care | Few times a week | Keyword |
| 2 | 2 | 23 | Female | Once a month | Clothing And Fashion | Few times a month | Keyword |
| 3 | 3 | 24 | Prefer not to say | Few times a month | Groceries And Gourmet Food | Few times a month | Keyword |
| 4 | 4 | 24 | Prefer not to say | Few times a month | Clothing And Fashion | Few times a month | Keyword |
| 5 | 5 | 24 | Female | Once a month | Beauty And Personal Care | Few times a month | Keyword |
| 6 | 6 | 24 | Female | Once a month | Clothing And Fashion | Few times a month | Keyword |
| 7 | 7 | 24 | Female | Once a month | Others | Few times a month | Keyword |
| 8 | 8 | 22 | Female | Less than once a month | Beauty And Personal Care | Few times a month | Filter |
| 9 | 9 | 22 | Female | Less than once a month | Clothing And Fashion | Few times a month | Filter |
| 10 | 10 | 21 | Female | Less than once a month | Clothing And Fashion | Rarely | Categories |
| 11 | 11 | 22 | Female | Less than once a month | Clothing And Fashion | Rarely | Filter |
| 12 | 12 | 21 | Female | Few times a month | Beauty And Personal Care | Rarely | Keyword |
| 13 | 13 | 21 | Female | Few times a month | Clothing And Fashion | Rarely | Keyword |
| 14 | 14 | 20 | Female | Less than once a month | Beauty And Personal Care | Few times a month | Keyword |
| 15 | 15 | 20 | Female | Less than once a month | Clothing And Fashion | Few times a month | Keyword |
| 16 | 16 | 23 | Female | Less than once a month | Beauty And Personal Care | Rarely | Keyword |
| 17 | 17 | 23 | Female | Less than once a month | Clothing And Fashion | Rarely | Keyword |
| 18 | 18 | 22 | Female | Less than once a month | Clothing And Fashion | Few times a month | Categories |
| 19 | 19 | 25 | Female | Multiple times a week | Beauty And Personal Care | Few times a week | Keyword |
| 20 | 20 | 25 | Female | Multiple times a week | Clothing And Fashion | Few times a week | Keyword |
| 21 | 21 | 25 | Female | Multiple times a week | Home And Kitchen | Few times a week | Keyword |
| 22 | 22 | 23 | Female | Less than once a month | Beauty And Personal Care | Few times a month | Keyword |
| 23 | 23 | 23 | Female | Less than once a month | Clothing And Fashion | Few times a month | Keyword |
| 24 | 24 | 24 | Female | Once a month | Clothing And Fashion | Few times a month | Keyword |
| 25 | 25 | 24 | Female | Once a month | Home And Kitchen | Few times a month | Keyword |
| 26 | 26 | 21 | Female | Less than once a month | Beauty And Personal Care | Few times a week | Keyword |
| 27 | 27 | 23 | Female | Less than once a month | Others | Rarely | Filter |
| 28 | 28 | 16 | Male | Few times a month | Clothing And Fashion | Few times a month | Keyword |
| 29 | 29 | 16 | Male | Few times a month | Others | Few times a month | Keyword |
| 30 | | | | | | | |

21 COLUMNS, 999+ ROWS Column profiling based on top 1000 rows PREVIEW DOWNLOADED AT 4:59 PM

Query Settings

PROPERTIES

Name Amazon Customer Behavior Survey

All Properties

APPLIED STEPS

Renamed Columns2

Reordered Columns

Filtered Rows1

Capitalized Each Word

Filtered Rows2

Removed Columns1

Capitalized Each Word1

Removed Columns2

Reordered Columns1

Filtered Rows3

Replaced Value

Filtered Rows4

Replaced Value1

Replaced Value2

Filtered Rows5

Replaced Value3

Filtered Rows6

Replaced Value4

Filtered Rows7

Replaced Value5

Filtered Rows8

Renamed Columns3

Replaced Value6

Replaced Value7

Replaced Value8

Important transformations:

1. promoting the first rows as column headers, changing column data types and removing unneeded/redundant columns.
 2. splitting the 'Purchase_Categories' column into different columns since it contained many categories for a single respondent; the column was split using the delimiter and then unpivoted to create unique rows for each category by each respondent.
 3. creating an 'Index' column; the data originally didn't include a unique identifier for different survey response submissions; it was important to follow this step after splitting the 'Purchase_Categories' column.
 4. renaming some categorical row values to ensure uniformity and clarity
- Using the SWITCH function to create a calculated column called 'Age Bracket'

Amazon Customer Behaviour Survey - Power BI Project - Power BI Desktop

Search

Shivam Sury

File Home Help Table tools Column tools

Name: Age Bracket Format: Text Summarization: Don't summarize Data type: Text Data category: Uncategorized

Structure Formatting Properties

Sort by column Sort Data groups Manage relationships New column Calculations

Age Bracket = SWITCH(TRUE(), [Age] >= 0 && [Age] < 18, "0-17 years", [Age] >= 18 && [Age] < 35, "18-34 years", [Age] >= 35 && [Age] < 55, "35-54 years", [Age] >= 55, "55+ years")

| Liability | Review_Helpfulness | Recommendation_Helpfulness | Rating_Accuracy | Shopping_Satisfaction | Service_Appreciation | Improvement_Areas | Age Bracket | Index | Age |
|-----------|--------------------|----------------------------|-----------------|-----------------------|-------------------------|---------------------------------|-------------|-------|-----|
| y | Yes | Sometimes | 3 | 2 | User-friendly interface | Customer service responsiveness | 18-34 years | 35 | 23 |
| y | Sometimes | Yes | 3 | 3 | Product recommendations | Customer service responsiveness | 18-34 years | 111 | 24 |
| y | Sometimes | Yes | 3 | 3 | Product recommendations | Customer service responsiveness | 18-34 years | 112 | 24 |
| - | No | No | 2 | 2 | Competitive prices | Customer service responsiveness | 18-34 years | 191 | 23 |
| - | Yes | Yes | 1 | 2 | Competitive prices | Customer service responsiveness | 18-34 years | 205 | 30 |
| - | Yes | Yes | 1 | 2 | Competitive prices | Customer service responsiveness | 18-34 years | 206 | 30 |
| y | No | No | 2 | 1 | Competitive prices | Customer service responsiveness | 18-34 years | 239 | 29 |
| - | Yes | Sometimes | 3 | 2 | Competitive prices | Customer service responsiveness | 55+ years | 297 | 63 |
| - | Yes | Sometimes | 3 | 2 | Competitive prices | Customer service responsiveness | 55+ years | 298 | 63 |
| - | Yes | Sometimes | 3 | 2 | Competitive prices | Customer service responsiveness | 55+ years | 299 | 63 |
| y | No | No | 2 | 3 | Product recommendations | Customer service responsiveness | 55+ years | 320 | 60 |
| y | No | No | 2 | 3 | Product recommendations | Customer service responsiveness | 55+ years | 321 | 60 |
| y | Yes | Yes | 3 | 3 | Product recommendations | Customer service responsiveness | 18-34 years | 364 | 24 |
| y | Yes | No | 3 | 3 | Product recommendations | Customer service responsiveness | 18-34 years | 380 | 23 |
| - | Yes | No | 3 | 3 | Competitive prices | Customer service responsiveness | 18-34 years | 381 | 21 |
| - | No | Sometimes | 2 | 3 | Wide product selection | Customer service responsiveness | 35-54 years | 406 | 39 |
| y | Yes | Yes | 3 | 4 | Wide product selection | Customer service responsiveness | 18-34 years | 408 | 25 |
| - | Yes | Yes | 3 | 1 | User-friendly interface | Customer service responsiveness | 18-34 years | 439 | 25 |
| - | No | Yes | 2 | 1 | Product recommendations | Customer service responsiveness | 18-34 years | 463 | 21 |
| y | No | No | 3 | 1 | Product recommendations | Customer service responsiveness | 18-34 years | 465 | 23 |
| y | No | No | 3 | 1 | Product recommendations | Customer service responsiveness | 18-34 years | 466 | 23 |
| y | No | No | 3 | 1 | Competitive prices | Customer service responsiveness | 18-34 years | 468 | 23 |
| - | Sometimes | No | 2 | 1 | Wide product selection | Customer service responsiveness | 18-34 years | 469 | 27 |
| y | No | Sometimes | 4 | 3 | Competitive prices | Customer service responsiveness | 35-54 years | 479 | 44 |
| - | Sometimes | Sometimes | 3 | 3 | Product recommendations | Customer service responsiveness | 18-34 years | 506 | 23 |
| - | Sometimes | Sometimes | 2 | 1 | Wide product selection | Customer service responsiveness | 35-54 years | 549 | 37 |
| - | Sometimes | Sometimes | 2 | 1 | Wide product selection | Customer service responsiveness | 35-54 years | 550 | 37 |
| - | Sometimes | Sometimes | 2 | 1 | Wide product selection | Customer service responsiveness | 35-54 years | 551 | 37 |
| - | Sometimes | Sometimes | 3 | 2 | Wide product selection | Customer service responsiveness | 35-54 years | 610 | 12 |

Table: Amazon Customer Behavior Survey (1,147 rows) Column: Age Bracket (4 distinct values)

The dataset comprised different ages for different respondents. For our analysis, I figured that converting individual age units into age brackets would summarize and categorize the age variable- an important demographic criterion.

Glossary:



SWITCH function: evaluates conditions and returns a value based on the first true condition.

Analytics Questions

After completing the data cleaning and processing phase, the stage was to determine the analytics questions which would be answered with elegant and informative data visualizations in the form of a dashboard.

Some of the analytics questions I have tried to answer:

- Q. What are the most popular product categories?
- Q. What is the preferred method for searching for products?
- Q. What is the purchase frequency for consumers?
- Q. What is the cart completion frequency (the tendency to complete an order after items have been added to the cart) for consumers?
- Q. What are some common factors that contribute to cart abandonment (consumers not completing their orders)?
- Q. What do shoppers appreciate most when shopping with Amazon?
- Q. What is the overall satisfaction score for consumers with Amazon?
- Q. What are some areas of improvement for Amazon?

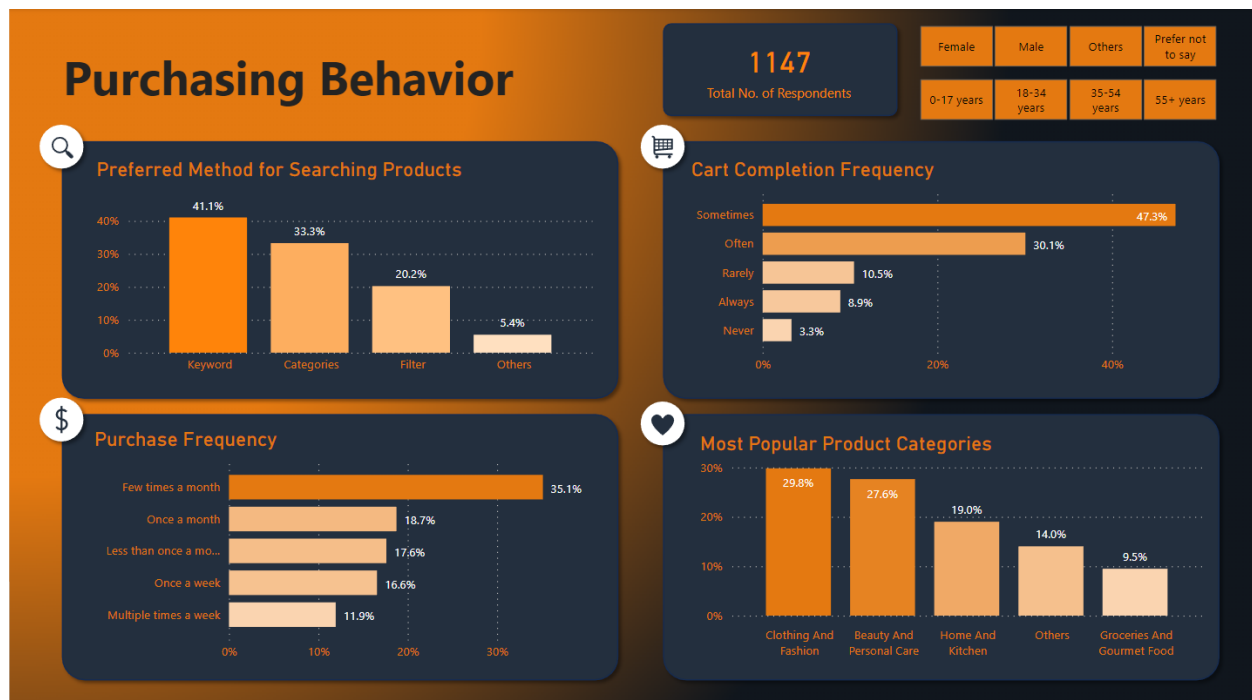
Analysis and Visualization

Before delving deep into the analysis and interpretation, here's a glance at the dashboards created:



Consumer Behavior Survey Data

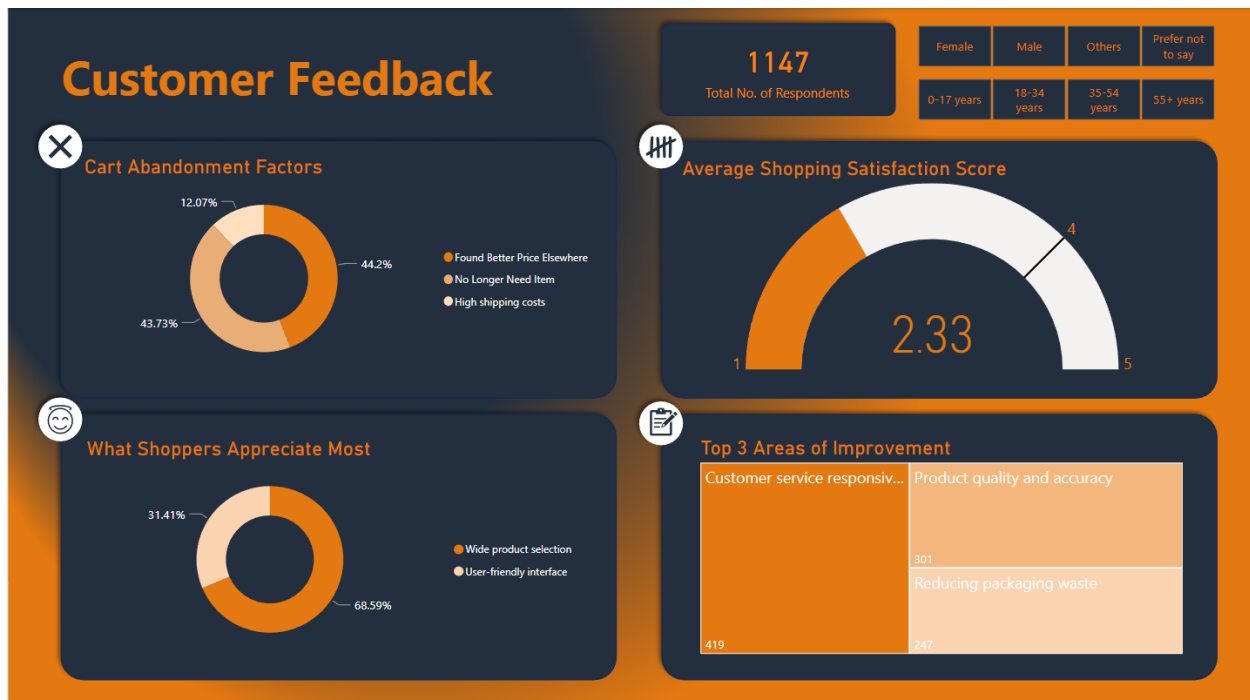
After shortlisting the data fields I wanted to utilize for analysis, I decided to break things down into two components (resulting in two dashboards): evaluating the **Purchasing Behavior** and the **Customer Feedback**.



For the first dashboard showcasing visualizations about Purchasing Behavior, the following were some of the key observations:

- The majority of consumers/users (41.1%) prefer to search for products by typing in the **Keywords** across various age groups and genders, followed by searching for products through the **Categories** dropdown on the website/app.
- **Female** shoppers tend to have a higher **purchase frequency** (38% shop a few times a month) as compared to **male** shoppers (30% of them shop less than once a month).
- The most popular product category for females turned out to be **Beauty and Personal Care (31.5%)** while for **males** it turned out to be **Clothing and Fashion (27.3%)**.
- Age groups **0-17 years** and **18-34 years** have a high shopping frequency in the **Clothing and Fashion** category. For the age group **35-54 years** there was a sharp increase in purchases for the **Home and Kitchen** category. Lastly, for the age group **55+ years**, the most popular product category came out to be **Beauty and Personal Care**.

- Around **77%** of consumers complete their purchases after adding products to their cart.



The second dashboard focuses more on evaluating the customer feedback received through the survey:

- The top three factors for a shopper abandoning their cart and not completing the purchase were the following in the same order: **found a better price elsewhere (44.2%)**, **no longer needed the item (43.7%)** and **high shipping costs (12%)**.
- The average **shopping satisfaction score** was recorded as **2.33** on a scale of 5.
- The most commonly valued aspects of Amazon's service were the presence of a **wide range of product selections** and a **user-friendly interface** on the website and app.
- Some key areas of improvement for the retail giant would be the following: **customer service responsiveness**, **product quality and accuracy**, and

reducing packing waste.

Recommendations

Based on the findings of the analysis, several recommendations are proposed for Amazon to enhance customer satisfaction and address areas for improvement:

1. Improve the **searchability of products** by investing in advanced keyword search algorithms and refining the search functionality.
2. **Personalize product recommendations** based on gender and age groups to cater to specific consumer preferences and increase customer engagement. It will also be helpful for **retargeting ads**.
3. Enhance **quality assurance** processes to ensure product accuracy, quality, and consistency, thereby improving customer trust and satisfaction.
4. Invest in **customer service training** and resources to **improve responsiveness** and resolve customer queries and concerns more efficiently.
5. Implement **eco-friendly packaging solutions** to reduce waste and align with the growing environmental consciousness of consumers.

Barring these more obvious recommendations that were deduced from the analysis, the most important recommendation would be to **dive deeper** into some of the areas explored in this analysis. The survey data gives us a fair high-level picture of the different elements inspected. But a more low-level and specific investigation would be required for each of these areas, as per importance and level of impact.

For instance, we did observe that customers appreciated a user-friendly interface. But what do they specifically like in the user interface? Is it the placement of different information objects (information architecture)? Is it the presence (or absence) of certain elements?

Or if consumers are not enjoying the customer service responsiveness, what are the identifiable causes for it? And what could be the potential and tailored solution for that?

Conclusion

In conclusion, this project provides a high-level analysis of the Amazon Consumer Behavior Survey dataset, revealing valuable insights into consumer preferences and behaviours.

The findings highlight significant patterns and trends related to product search methods, purchase frequency, cart completion, cart abandonment factors, satisfaction levels, and areas for improvement.

The recommendations put forth aim to assist Amazon in enhancing its offerings, improving customer satisfaction, and refining its strategies to better cater to the needs and preferences of its consumers.

By leveraging the insights gained from this analysis, Amazon can further establish its position as a customer-centric and adaptive e-commerce platform.

References

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customer-centric-innovation/