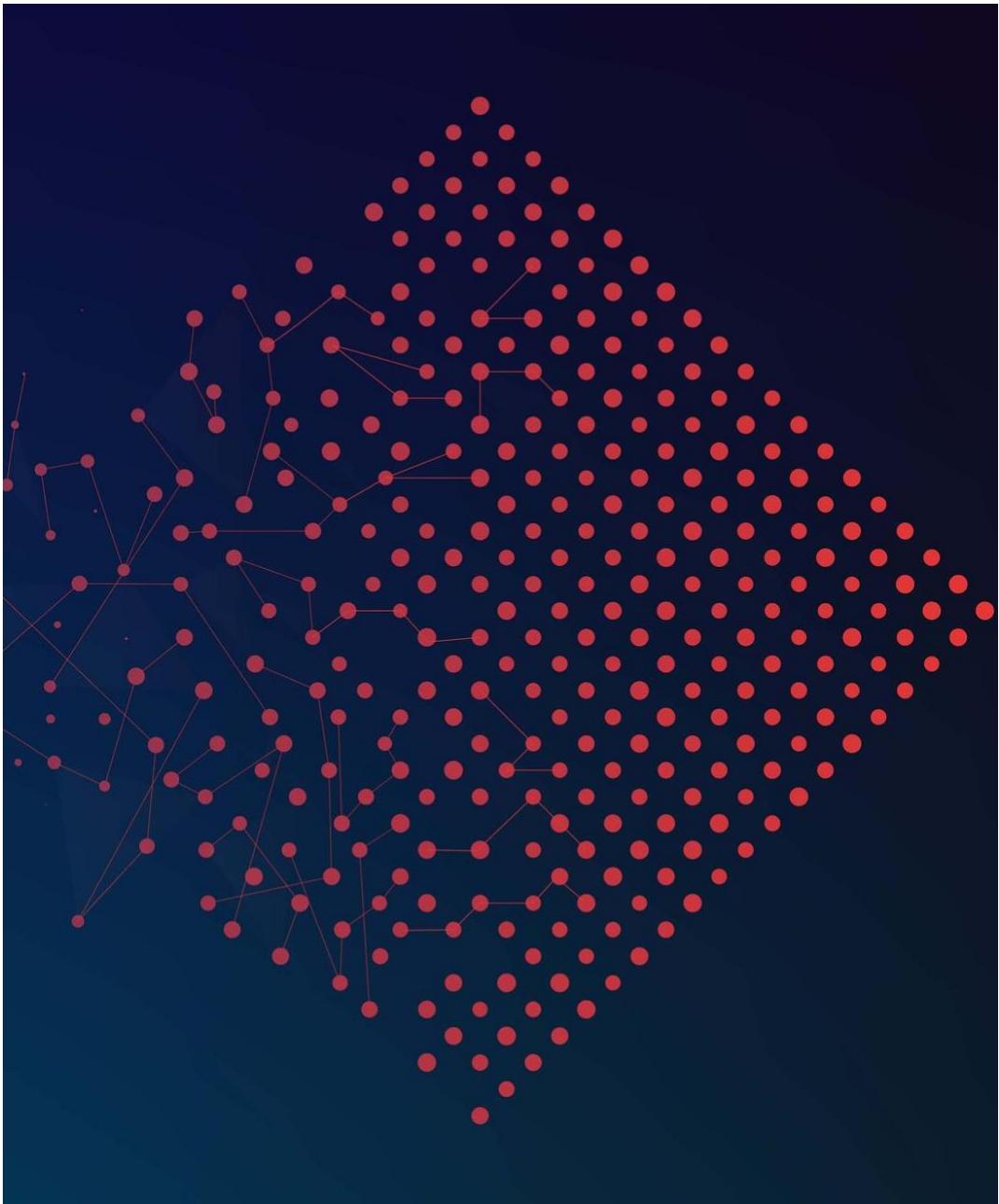


# **ASSIGNMENT 1: 2MARKET**

## **MAY 2022**



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*I, Javier Conde Pascual, certify that this is an original piece of work. I have acknowledged all sources and citations. No section of this assignment has been plagiarized.*



A handwritten signature in black ink, appearing to read "Javier Conde Pascual". The signature is written in a cursive style with a horizontal line underneath it.

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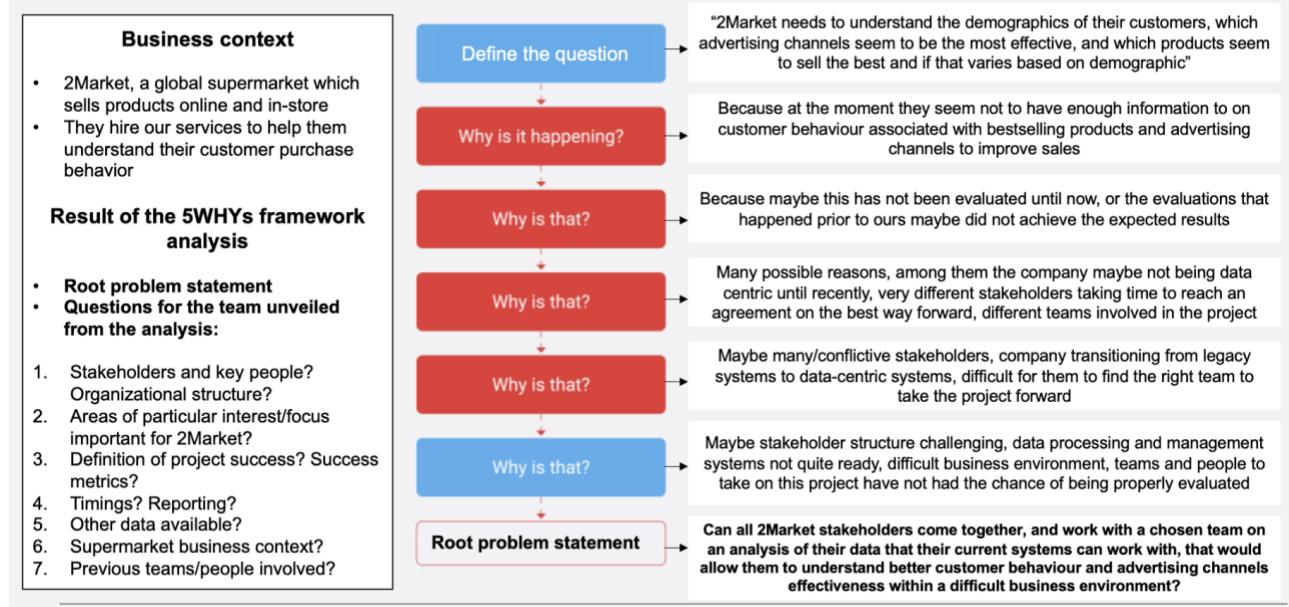


# Chapter 1

## Background and context of the business

The background, scenario and context provided beforehand for this report are available [here](#). Sakichi Toyoda's Five Whys Framework is applied on it to find the business problem (and define any important questions for both the 2Market team and the data provided, Figure 1.1. below). This helps also formulating the data analytics problem, building a process to follow accordingly.

**Figure 1.1: Five Whys Framework analysis on 2Market provided information**



Source: LSE and Javier Conde (2022)

This helps understanding the “who”, “what”, “where”, “when” and “why” of our analysis. Now let’s study the “how”: the analytical approach used.

## Chapter 2

# Analytical approach

This analytical approach has four key points:

1. Bringing stakeholders together through analyzing the data focusing on customer demographics, most effective advertising channels and bestselling products
2. Their particular interest in customers with married marital status, age 45 to 50 and income between \$90k and \$100k
3. Assessing the quality of the data provided, as their systems/data processing and management capabilities may be different than expected
4. All visualizations to be created as accessible as possible through very legible fonts (Arial), big font sizes (10-12 onwards when possible), clear head titles and colors that are color-blind and color-contrast friendly among other features

Evaluation, cleaning, formatting, and preparation for Tableau and PgAdmin import on the two files provided (marketing\_data and ad\_data) is completed and reported in the project cleaning log (Figure 2.1 below).

Figure 2.1: Data Quality Framework analysis on 2Market provided files and cleaning log

A	B	C	D	E	F	G
1 Original data file	Issues found/Operation	Final file version	Total records when file saved	Date	Used on Tableau	Used on PostgreSQL
2 Marketing_data.CSV	Import into excel	Marketing_data.xlsx	2216	20/04/2022	No	No
3 Marketing_data.xlsx	Creation of tab "cleaning log", "raw data", "marketing data"	Marketing_data.xlsx	2216	20/04/2022	No	No
4 Marketing_data.xlsx	Clean duplicates through row comparison using =IF(COUNTIF(\$A\$2:\$A\$2011,\$A2)>1,"Duplicate","Unique") formula on 8 control columns: Year_Birth, Income_D_Customer, Amt column. Double-control manually on duplicates. Found 206 records verified duplicated, second manual verification and erase.	Marketing_data CLEAN.xlsx	2010	20/04/2022	No	No
5 Marketing_data CLEAN.xlsx	Format correction and standardisation in columns "Year_birth", "Marital_Status" (Wrong Values on marital status (absurd values)), substituted for "Not declared", "Together" substituted for "Married", "Alone" for "Single", final values Married - Single - Widower - Divorced - Not declared - Unknown", "Dt_Customer", "Amt_Lic", "Amt_Veg", "Amt_NevVeg", "Amt_Pst", "Amt_Chocolates", "Amt_Comm", "Country". Creation of columns CLEAN preserving original format and data for safekeeping. Outline detected, record ID 9432 salary \$666,666.	Marketing_data CLEAN2.xlsx	2010	20/04/2022	No	No
6 Marketing_data CLEAN2.xlsx	Create columns "Age in 2022" with formula =(2022-Year_Birth), "Amt_HoodTotal" (sum of Amt, "Amt_total" for additional data to use in Tableau	Marketing_data CLEAN3.xlsx	2010	27/04/2022	Yes	No
7 Marketing_data CLEAN3.xlsx	Creation of tabs "pivots", "analysis and charts" for graphic analysis and visualisations	Week 2 - Assignment Activity - Marketing_data CLEAN	2010	28/04/2022	No	No
8 Marketing_data CLEAN3.xlsx	Further cleaning and column format to prepare for CSV export to PostgreSQL	Marketing_data CSV	2010	06/05/2022	No	Yes
9 Ad_data.CSV	Import into excel	Ad_data.xlsx	2216	06/05/2022	No	No
10 Ad_data.xlsx	No duplicates found using =IF(COUNTIF(\$A\$2:\$A\$2011,\$A2)>1,"Duplicate","Unique") on id column. Preparation of data format and change of columns titles for SQL export	Ad_data CLEAN.xlsx	2216	06/05/2022	No	Yes
11 Ad_data CLEAN.xlsx	Review and format for Tableau export	Ad_data CLEAN2.xlsx	2216	06/05/2022	Yes	No

Source: gov.uk, DAMA UK and Javier Conde (2022)

### Findings on data quality:

1. 206 records (9.2%) on the file provided are duplicated; they are eliminated from the file to be analyzed.
2. Record Id 9432 (salary \$666,666) detected as a possible outlier: not eliminated as other columns seem to be correct. Monitored to ensure that it does not skew analysis.

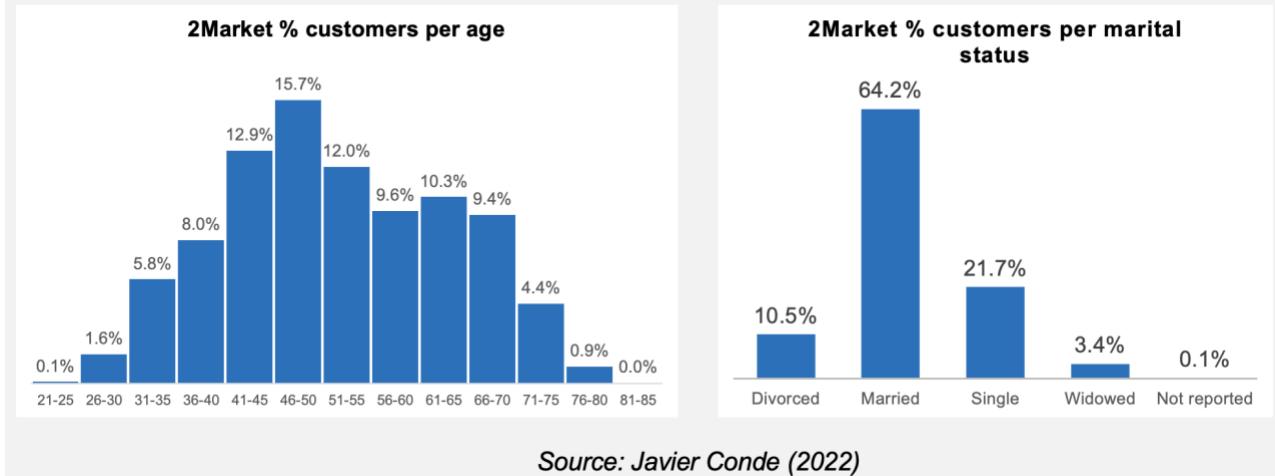
These issues, added to Excel (Figure 2.9) and SQL (Figure 2.22) findings below, may be relevant for 2Market stakeholders and will be reminded in Chapter 4 of this report.

Let's now analyze and visualize the data in both Excel and PgAdmin (SQL).

## 2.1. Excel Analysis

Based on the provided 2Market interests, the analysis of the data on Excel is completed in three stages: general findings (all customers), findings for the 45 to 50 y.o. segment (21.2% of total customers), findings for the \$90k to \$100k yearly income segment (1.9% of total customers). Please find below a recap of the visualizations (Figures 2.2 to 2.8) together with the findings and insights observed (Figure 2.9).

*Figure 2.2: Percentages of 2Market customers per age/marital status*



*Figure 2.3: Average age of 2Market customers (per marital status and total)*

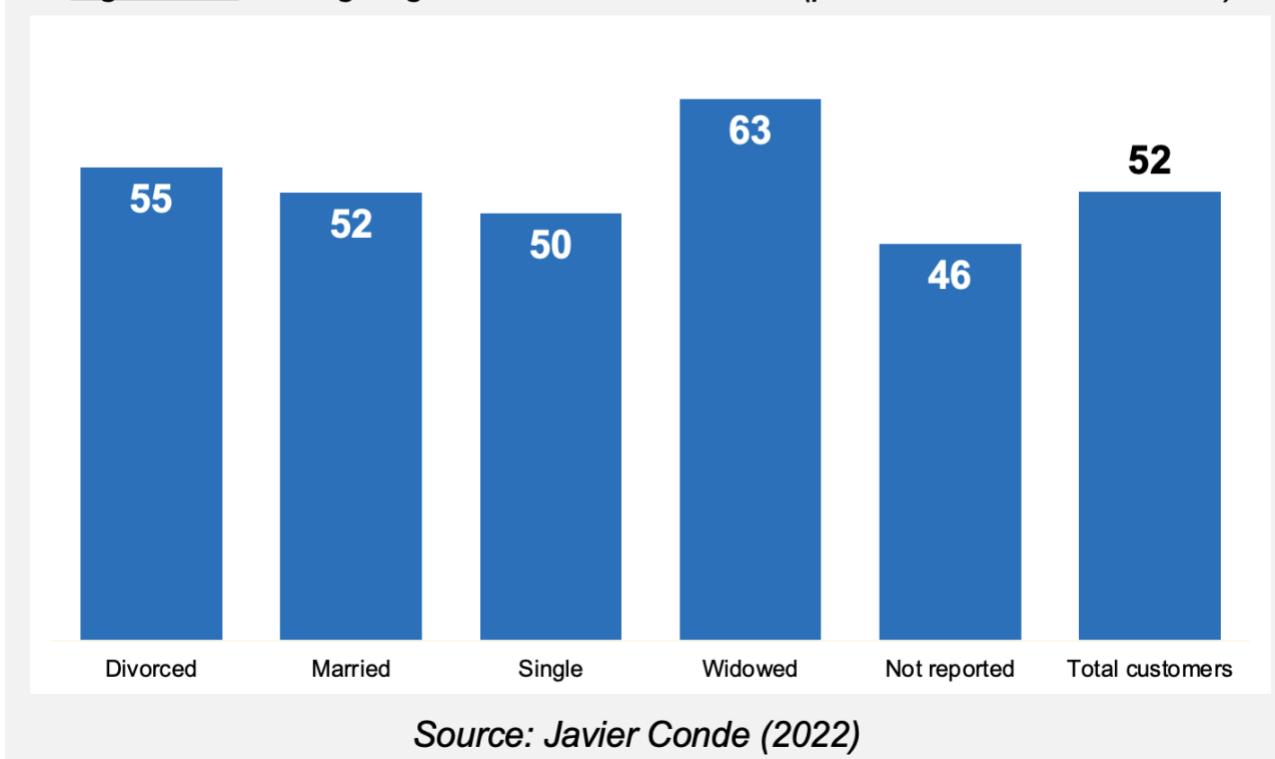
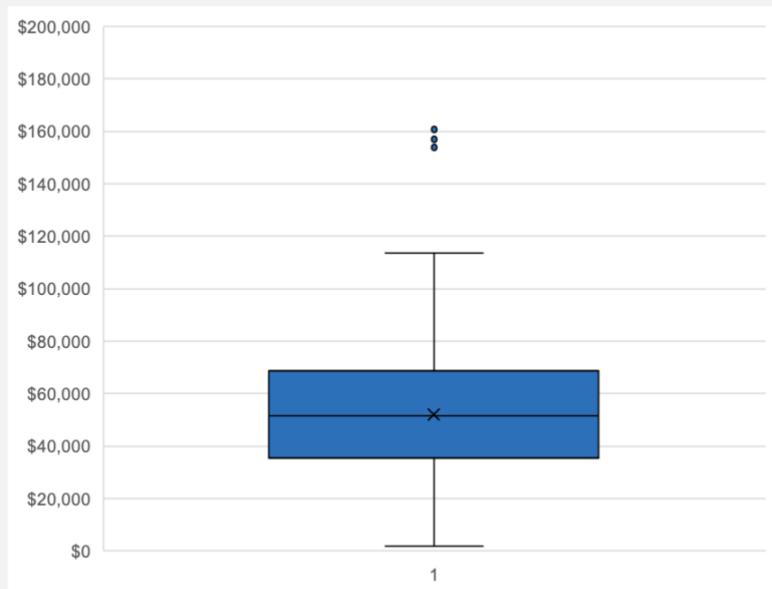
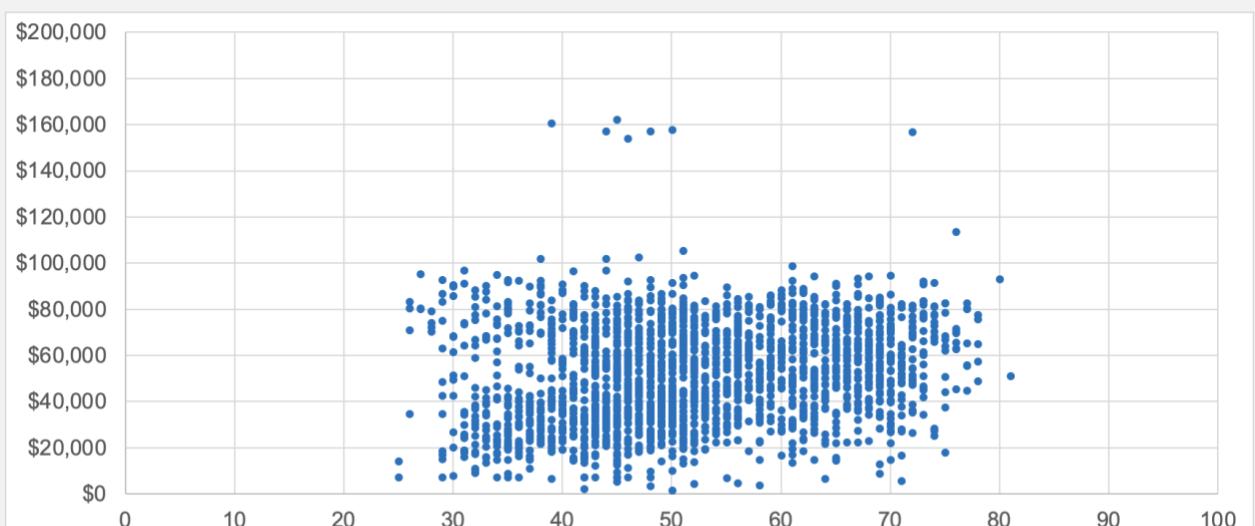


Figure 2.4: Quartile/Median distribution for customers yearly income



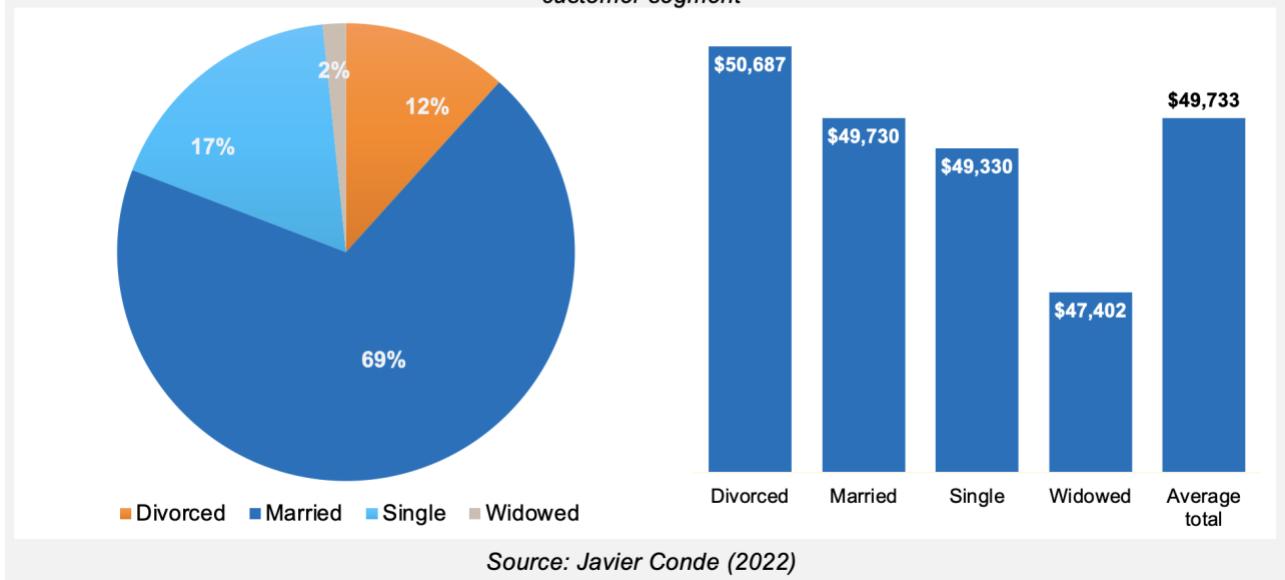
Source: Javier Conde (2022)

Figure 2.5: Distribution of total customers yearly income x customer age



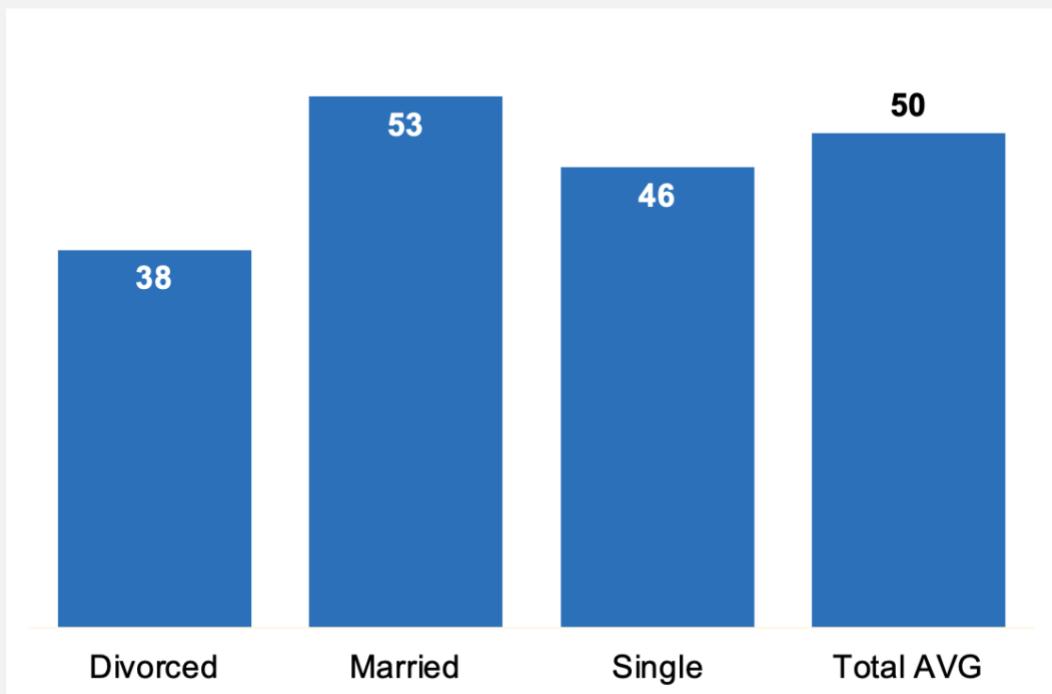
Source: Javier Conde (2022)

Figure 2.6: Percentage per marital status and yearly income (per marital status and total) in 45 to 50 y.o. customer segment



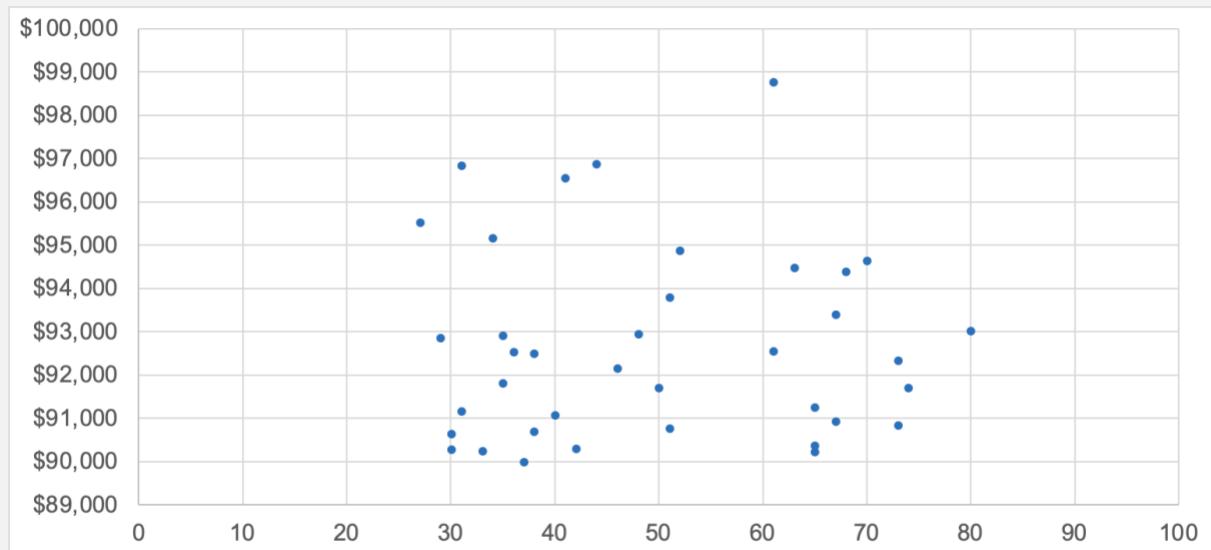
Source: Javier Conde (2022)

Figure 2.7: Average customer age per marital status in \$90k to \$100k yearly income customer segment



Source: Javier Conde (2022)

**Figure 2.8: Distribution of customers yearly income (\$90k to \$100k range) x customer age**



Source: Javier Conde (2022)

**Figure 2.9: Findings of 2Market Excel Analysis**

#### GENERAL FINDINGS

- customers between 46 and 55 are the most represented group (15.7% of total customers), followed by 41-45 (12.9%) and 51-55 (12%)
- 64.2% of the customers declare themselves married, 21.7% single (Figure 2.2)
- The average age of the 2Market customer is 52 (Figure 2.3)
- The median yearly income is \$51,529 with some customers on the \$160k range (outliers) (Figure 2.4)
- 2Market's majority of customers are between 30 to 75 years old, with income range between \$20k and \$90k (Figure 2.5)

#### FINDINGS FOR THE 45 TO 50 Y.O. SEGMENT

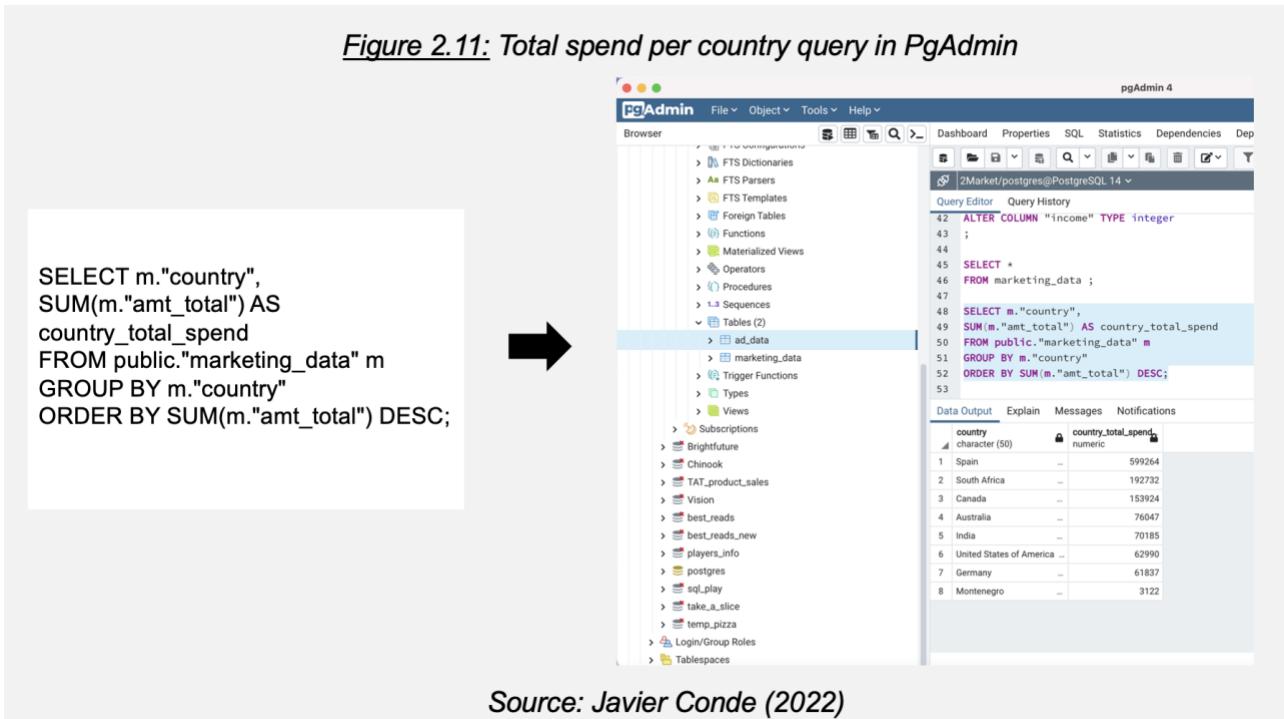
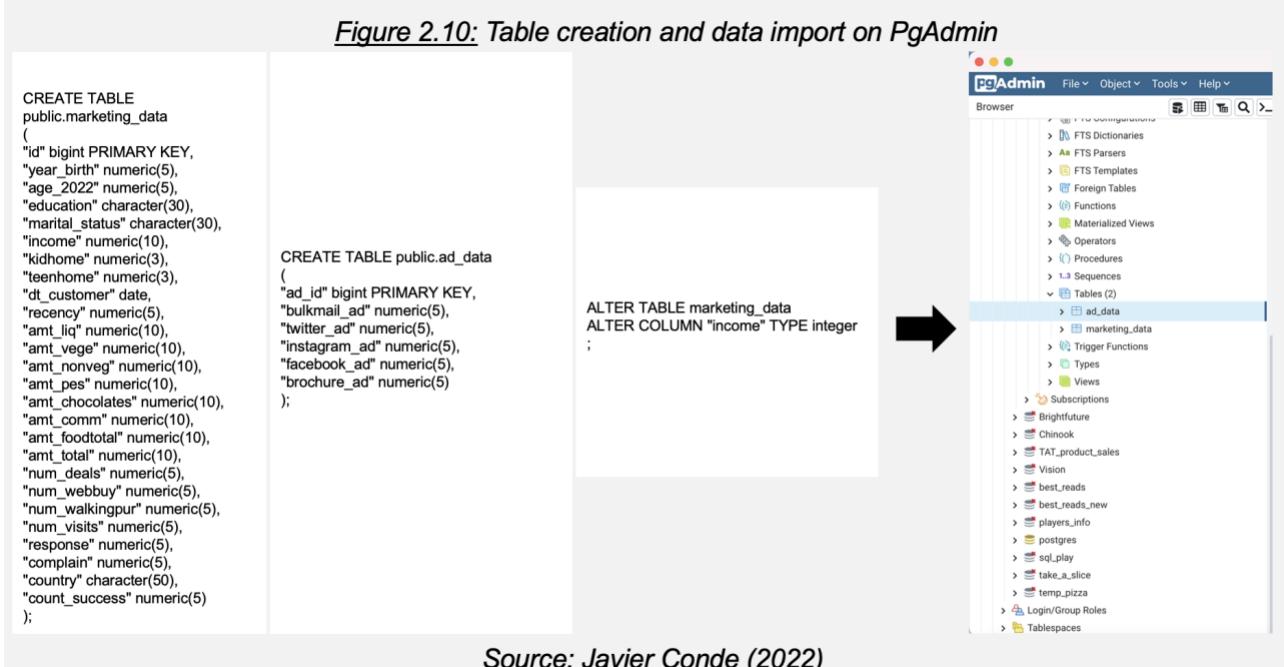
- 69% customers on this segment declare themselves married, 17% single, 12% divorced (Figure 2.7)
- Average yearly income for this segment is \$49,733, divorced being the group with highest average income available (\$50,687) (Figure 2.7)

#### FINDINGS FOR THE \$90K TO \$100K YEARLY INCOME SEGMENT

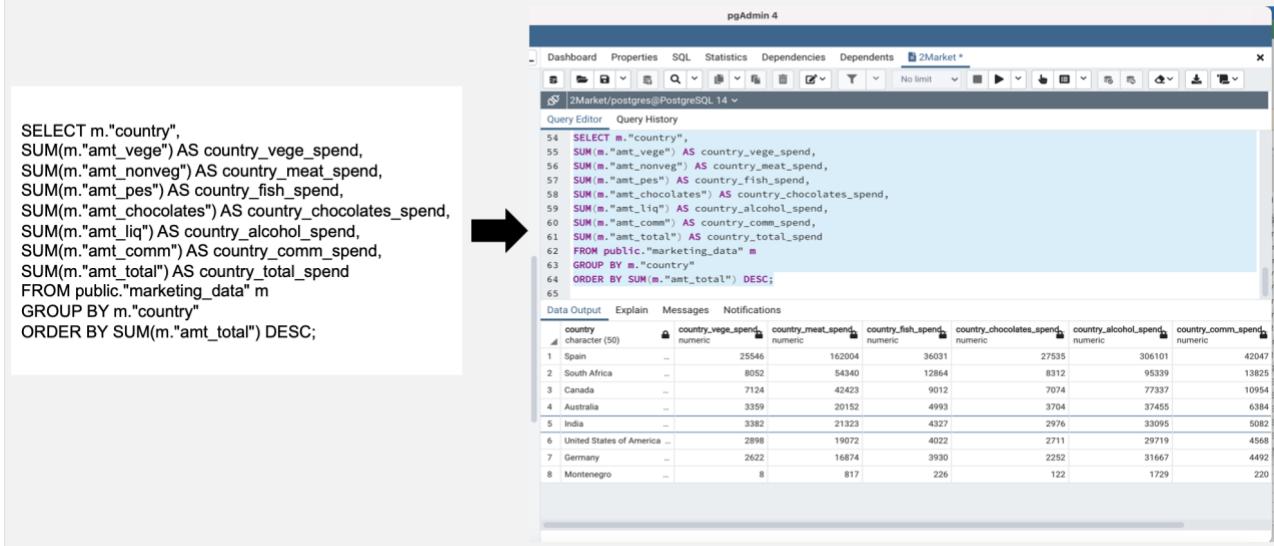
- Average age of this segment is 50 y.o., with married customers on average 53 y.o, single 46 and divorced 38 (Figure 2.8)
- Distribution age/income for this segment do not suggest a straightforward intuitive relationship between these variables (Figure 2.8)

Source: Javier Conde (2022)

## 2.2. SQL Analysis



*Figure 2.12: Most popular products per country query on PgAdmin*



```

SELECT m."country",
SUM(m."amt_vege") AS country_vege_spend,
SUM(m."amt_nonveg") AS country_meat_spend,
SUM(m."amt_pes") AS country_fish_spend,
SUM(m."amt_chocolates") AS country_chocolates_spend,
SUM(m."amt_liq") AS country_alcohol_spend,
SUM(m."amt_comm") AS country_comm_spend,
SUM(m."amt_total") AS country_total_spend
FROM public."marketing_data" m
GROUP BY m."country"
ORDER BY SUM(m."amt_total") DESC;

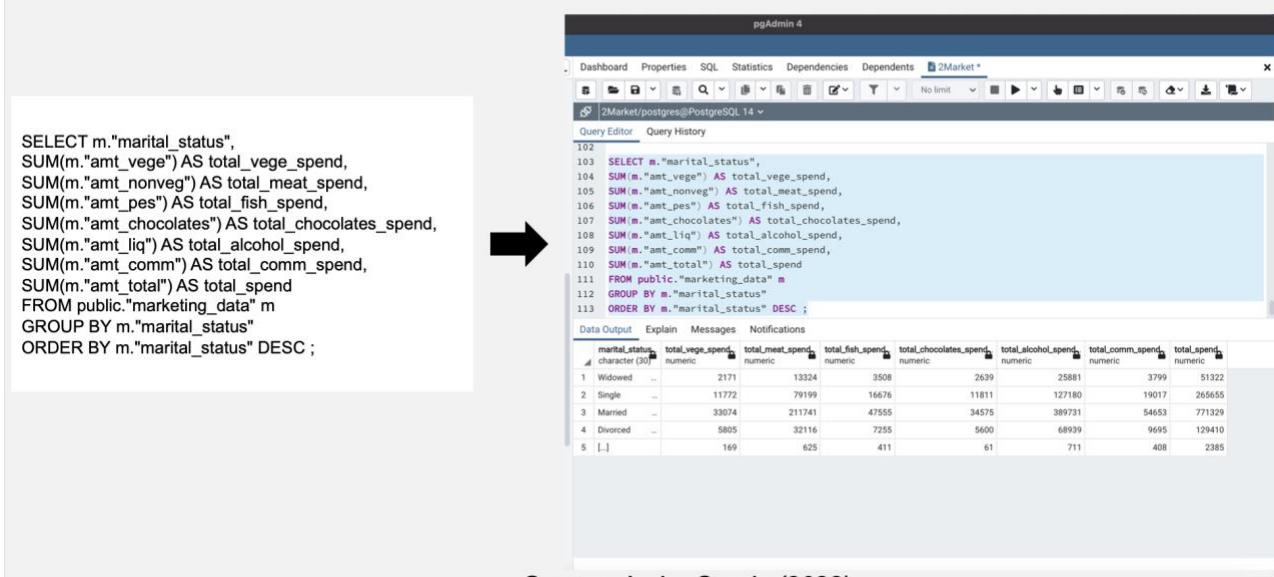
```

The screenshot shows the pgAdmin interface with a query editor containing the SQL code above. To the right of the editor is a large black arrow pointing right. Below the editor is a data output table with 8 rows, each representing a country and its total spend across various categories. The columns are: country, character(50), country\_vege\_spend, numeric, country\_meat\_spend, numeric, country\_fish\_spend, numeric, country\_chocolates\_spend, numeric, country\_alcohol\_spend, numeric, and country\_comm\_spend, numeric.

country	character(50)	country_vege_spend	country_meat_spend	country_fish_spend	country_chocolates_spend	country_alcohol_spend	country_comm_spend
1 Spain	—	25546	162004	36031	27535	306101	42047
2 South Africa	—	8052	54340	12864	8312	95339	13825
3 Canada	—	7124	42423	9012	7074	77337	10954
4 Australia	—	3359	20152	4993	3704	37455	6384
5 India	—	3382	21323	4327	2976	33095	5082
6 United States of America	—	2898	19072	4022	2711	29719	4568
7 Germany	—	2622	16874	3930	2252	31667	4492
8 Montenegro	—	8	817	226	122	1729	220

Source: Javier Conde (2022)

*Figure 2.13: Most popular products by marital status query on PgAdmin*



```

SELECT m."marital_status",
SUM(m."amt_vege") AS total_vege_spend,
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(m."amt_total") AS total_spend
FROM public."marketing_data" m
GROUP BY m."marital_status"
ORDER BY m."marital_status" DESC ;

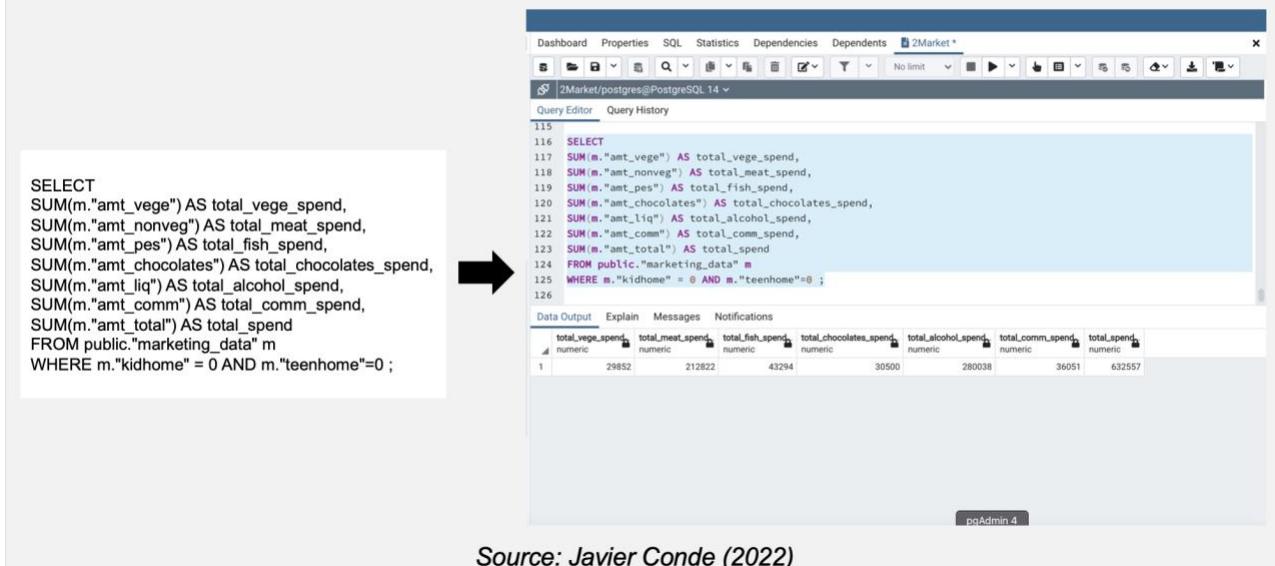
```

The screenshot shows the pgAdmin interface with a query editor containing the SQL code above. To the right of the editor is a large black arrow pointing right. Below the editor is a data output table with 5 rows, each representing a marital status and its total spend across various categories. The columns are: marital\_status, character(10), total\_vege\_spend, numeric, total\_meat\_spend, numeric, total\_fish\_spend, numeric, total\_chocolates\_spend, numeric, total\_alcohol\_spend, numeric, total\_comm\_spend, numeric, and total\_spend, numeric.

marital_status	character(10)	total_vege_spend	total_meat_spend	total_fish_spend	total_chocolates_spend	total_alcohol_spend	total_comm_spend	total_spend
1 Widowed	—	2171	13324	3508	2639	25881	3799	51322
2 Single	—	11772	79199	16676	11811	127180	19017	265655
3 Married	—	33074	211741	47555	34575	389731	54653	771329
4 Divorced	—	5805	32116	7255	5600	68939	9695	129410
5 [...]	—	169	625	411	61	711	408	2385

Source: Javier Conde (2022)

*Figure 2.14: Most popular products by no teens/no kids at home query on PgAdmin*



The screenshot shows a PgAdmin interface with a query editor window. The query is:

```

SELECT
SUM(m."amt_vege") AS total_vege_spend,
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(m."amt_total") AS total_spend
FROM public."marketing_data" m
WHERE m."kidhome" = 0 AND m."teenhome"=0 ;

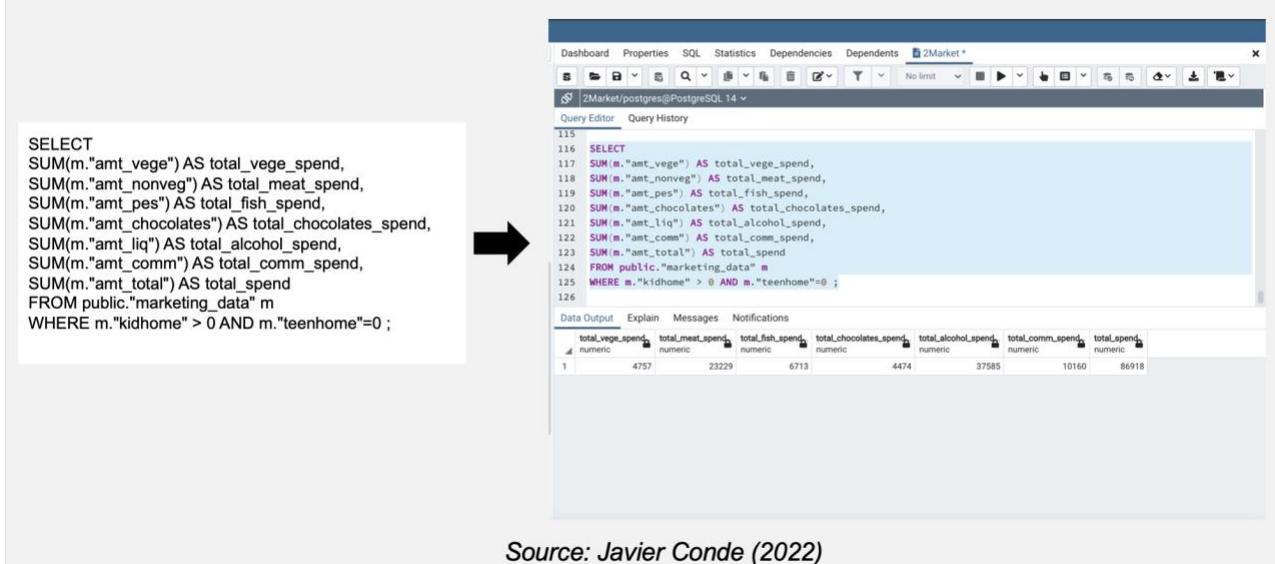
```

The results table has the following data:

	total_vege_spend	total_meat_spend	total_fish_spend	total_chocolates_spend	total_alcohol_spend	total_comm_spend	total_spend
1	29852	212822	43294	30500	280038	36051	632557

*Source: Javier Conde (2022)*

*Figure 2.15: Most popular products by no teens/kids at home query on PgAdmin*



The screenshot shows a PgAdmin interface with a query editor window. The query is:

```

SELECT
SUM(m."amt_vege") AS total_vege_spend,
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(m."amt_total") AS total_spend
FROM public."marketing_data" m
WHERE m."kidhome" > 0 AND m."teenhome"=0 ;

```

The results table has the following data:

	total_vege_spend	total_meat_spend	total_fish_spend	total_chocolates_spend	total_alcohol_spend	total_comm_spend	total_spend
1	4757	23229	6713	4474	37585	10160	86918

*Source: Javier Conde (2022)*

Figure 2.16: Most popular products by teens/no kids at home query on PgAdmin

```

SELECT
SUM(m."amt_vege") AS total_vege_spend,
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(m."amt_total") AS total_spend
FROM public."marketing_data" m
WHERE m."kidhome" =0 AND m."teenhome">>0 ;

```

The screenshot shows the PgAdmin interface with the query editor containing the above SQL code. An arrow points from the code area to the results table. The results table has columns: total\_vege\_spend, total\_meat\_spend, total\_fish\_spend, total\_chocolates\_spend, total\_alcohol\_spend, total\_comm\_spend, and total\_spend. The data row shows values: 15922, 83116, 21944, 16947, 246757, 32954, and 417640 respectively.

Source: Javier Conde (2022)

Figure 2.17: Most popular products by teens/kids at home query on PgAdmin

```

SELECT
SUM(m."amt_vege") AS total_vege_spend,
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(m."amt_total") AS total_spend
FROM public."marketing_data" m
WHERE m."kidhome" >0 AND m."teenhome">>0 ;

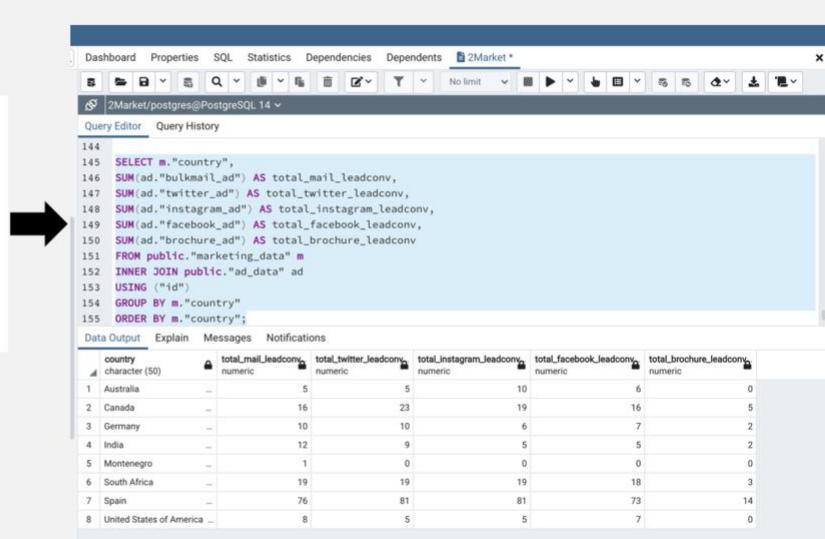
```

The screenshot shows the PgAdmin interface with the query editor containing the above SQL code. An arrow points from the code area to the results table. The results table has columns: total\_vege\_spend, total\_meat\_spend, total\_fish\_spend, total\_chocolates\_spend, total\_alcohol\_spend, total\_comm\_spend, and total\_spend. The data row shows values: 2460, 17838, 3454, 2765, 48062, 8407, and 82986 respectively.

Source: Javier Conde (2022)

*Figure 2.18: Most effective advertising channel by country query on PgAdmin*

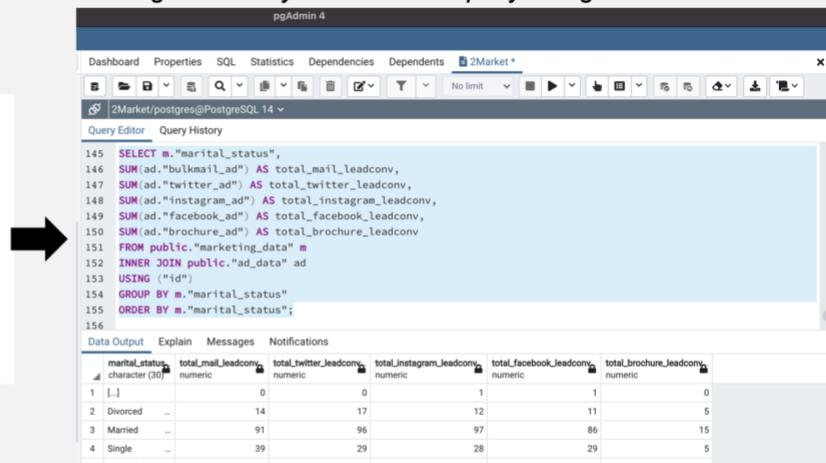
```
SELECT m."country",
SUM(ad."bulkmail_ad") AS total_mail_leadconv,
SUM(ad."twitter_ad") AS total_twitter_leadconv,
SUM(ad."instagram_ad") AS total_instagram_leadconv,
SUM(ad."facebook_ad") AS total_facebook_leadconv,
SUM(ad."brochure_ad") AS total_brochure_leadconv
FROM public."marketing_data" m
INNER JOIN public."ad_data" ad
USING ("id")
GROUP BY m."country"
ORDER BY m."country";
```



Source: Javier Conde (2022)

*Figure 2.19: Most effective advertising channel by marital status query on PgAdmin*

```
SELECT m."marital_status",
SUM(ad."bulkmail_ad") AS total_mail_leadconv,
SUM(ad."twitter_ad") AS total_twitter_leadconv,
SUM(ad."instagram_ad") AS total_instagram_leadconv,
SUM(ad."facebook_ad") AS total_facebook_leadconv,
SUM(ad."brochure_ad") AS total_brochure_leadconv
FROM public."marketing_data" m
INNER JOIN public."ad_data" ad
USING ("id")
GROUP BY m."marital_status"
ORDER BY m."marital_status";
```



Source: Javier Conde (2022)

Figure 2.20: Most effective social media platform by country query on PgAdmin (I)

```

SELECT m."country",
SUM(m."amt_nonveg") AS total_meat_spend,
SUM(m."amt_vege") AS total_veg_spend,
SUM(m."amt_pes") AS total_fish_spend,
SUM(m."amt_chocolates") AS total_chocolates_spend,
SUM(m."amt_liq") AS total_alcohol_spend,
SUM(m."amt_comm") AS total_comm_spend,
SUM(ad."twitter_ad") AS total_twitter_leadconv,
SUM(ad."instagram_ad") AS total_instagram_leadconv,
SUM(ad."facebook_ad") AS total_facebook_leadconv
FROM public."marketing_data" m
INNER JOIN public."ad_data" ad
USING ("id")
GROUP BY m."country"
ORDER BY m."country";

```

country	total_meat_spend	total_veg_spend	total_fish_spend	total_chocolates_spend	total_alcohol_spend	total_comm_spend	total_twitter_leadconv
1 Australia	—	20152	3359	4993	3704	37455	6384
2 Canada	—	42423	7124	9012	7074	77337	10954
3 Germany	—	16874	2622	3930	2252	31667	4492
4 India	—	21323	3382	4327	2976	33095	5082
5 Montenegro	—	817	8	226	122	1729	220
6 South Africa	—	54340	8052	12864	8312	95339	13825
7 Spain	—	162004	25546	36031	27535	306101	42047
8 United States of America	—	19072	2898	4022	2711	29719	4568

Source: Javier Conde (2022)

Figure 2.21: Most effective social media platform by country query on PgAdmin (II)

```

SELECT m."country",
SUM(m."amt_total") AS total_spend,
SUM(ad."twitter_ad") AS total_twitter_leadconv,
SUM(ad."instagram_ad") AS total_instagram_leadconv,
SUM(ad."facebook_ad") AS total_facebook_leadconv
FROM public."marketing_data" m
INNER JOIN public."ad_data" ad
USING ("id")
GROUP BY m."country"
ORDER BY m."country";

```

country	total_spend	total_twitter_leadconv	total_instagram_leadconv	total_facebook_leadconv
1 Australia	76047	5	10	6
2 Canada	153924	23	19	16
3 Germany	61837	10	6	7
4 India	70185	9	5	5
5 Montenegro	3122	0	0	0
6 South Africa	192732	19	19	18
7 Spain	599264	81	81	73
8 United States of America	62990	5	5	7

Source: Javier Conde (2022)

Figure 2.22: Findings of 2Market SQL Analysis

## GENERAL FINDINGS

- Highest spending country is Spain (total customer expenditure \$599,264), followed by South Africa (\$192,732) and Canada (\$153,924)
- Most popular products in all countries where 2Market is present are meat products (1<sup>st</sup>) and alcoholic beverages (2<sup>nd</sup>), regardless customers' marital status
- The most successful advertising channels are Twitter (1<sup>st</sup>) and Instagram (2<sup>nd</sup>) (except in Australia, where Instagram leads followed by Facebook, and in Spain and South Africa where lead generation values are the same)
- Bulk-mailing appears to lead to great conversions in every country. It is advised to acknowledge it and study more in depth any marketing comms through direct e-mail

*Source: Javier Conde (2022)*

These XLSX and SQL findings evidence that 2Market would add enormous measurable value if they could have a flexible resource where they could have readily available demographic, geographic, and product sales insights through reliable metrics instantly. Let's explore if a Tableau interactive dashboard could be that tool.

## Chapter 3

# Dashboard design and development

All cleaned data is already prepared to be imported into Tableau in XLSX format. Both files/tables (marketing\_data CLEAN2.xlsx and ad\_data CLEAN2, Figure 2.1) are imported and combined through an inner join, as what would deliver the bigger value in 2Market case is studying the data from values matching from both tables. In next stages the possibility of using an outer left join could be also explored (if the values from the marketing table that do not have a match on the ad table could reveal other insights).

The metrics that XLSX and SQL findings reveal as the more useful to 2Market to maximise value, make better informed business decisions and explore inside trends are as follows:

1. 2Market related: expenditure, product category, country, channel lead conversions
2. Customer related: marital status, age, yearly income

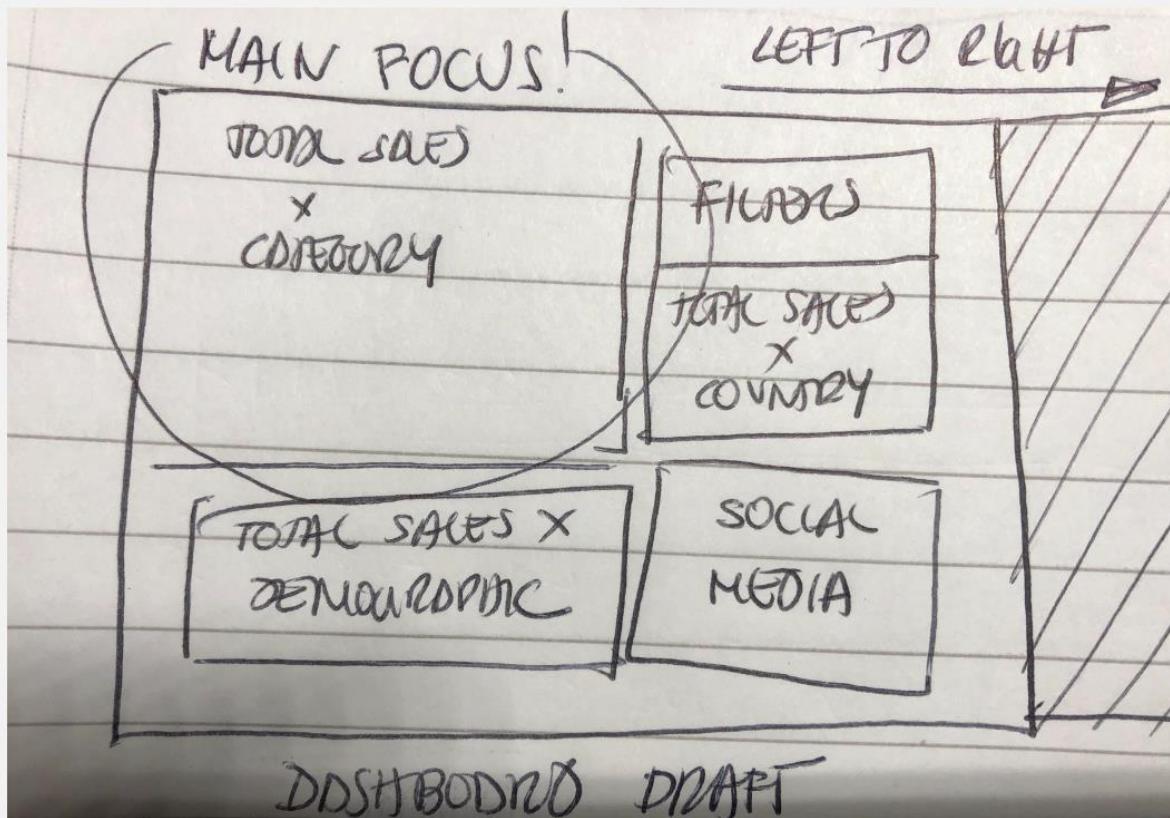
The dashboard built on these metrics will be designed to allow company stakeholders to explore their combination and maximise:

1. Data query flexibility (through graphics responsive to several filters at the same time)
2. User-friendliness
3. Accuracy, clarity, and stakeholder relevance (in this case, it is assumed that stakeholders may come from all levels -junior to executive- and departments across the organisation)
4. Interactivity (intuitive and easy to use filters and dynamic titles)
5. Accessibility (colour-blind and colour- contrast friendly colour palettes, font types and sizes, focus from left-top to right-bottom, use of intuitive bar charts and simple numerical displays)
6. Insightfulness (truly helps its users to explore new, useful, reliable data and make informed business decisions)

7. Business ethics (no sensitive data displayed in the dashboard)

With all these points in mind, a first draft on paper is designed to be translated to Tableau (Figure 3.1 below).

**Figure 3.1: Interactive dashboard draft for Tableau**

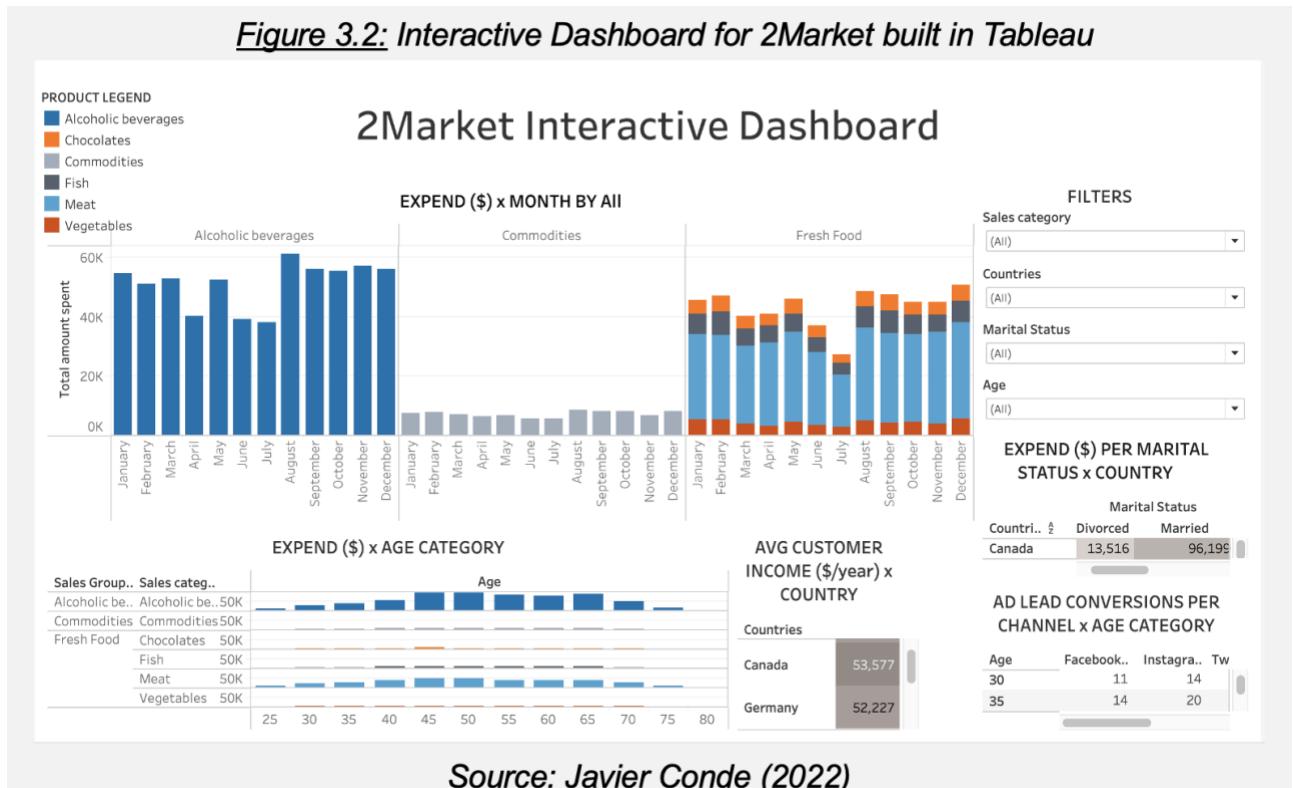


Source: Javier Conde (2022)

The metrics that will feed this dashboard are defined as:

1. Expenditure per month by product
2. Expenditure per age category (in bins of data width 5: e.g., value “25” meaning customers 25-30 y.o.)
3. Expenditure per marital status and country
4. Average yearly income per country
5. Ad lead conversion per age category

These concepts and metrics translate into the below Tableau Interactive Dashboard for 2Market as shown in Figure 3.2.



Source: Javier Conde (2022)

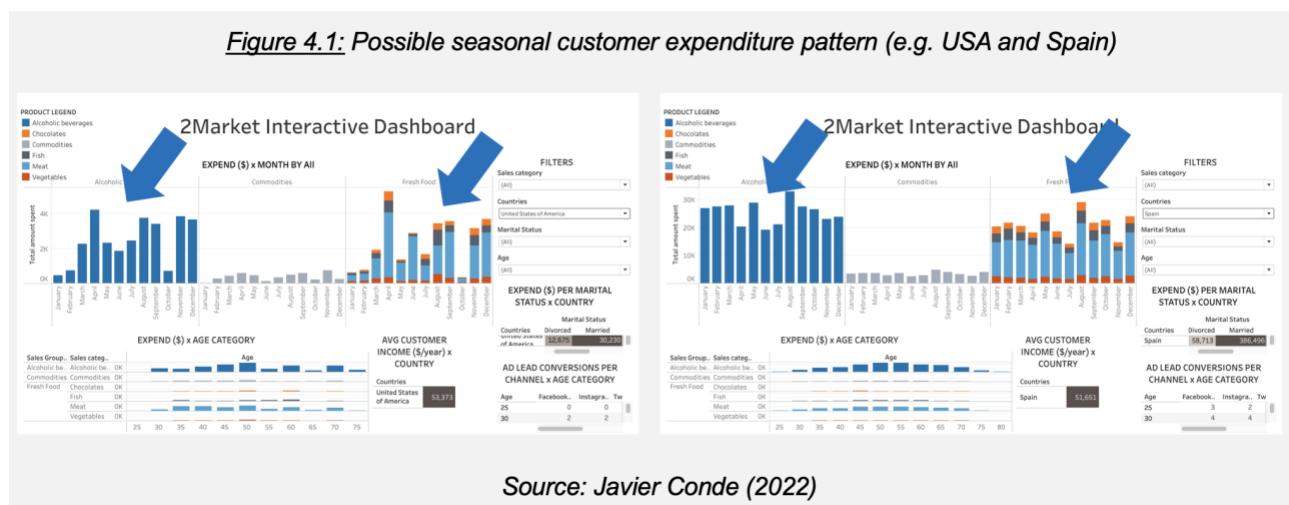
Let's finalize this report exploring the insights and patterns that this dashboard uncovers, with further advice and recommendations for 2Market to consider exploring.

## Chapter 4

# Patterns, trends, insights, recommendations

At first glance immediate and visible insights emerge while exploring this dashboard:

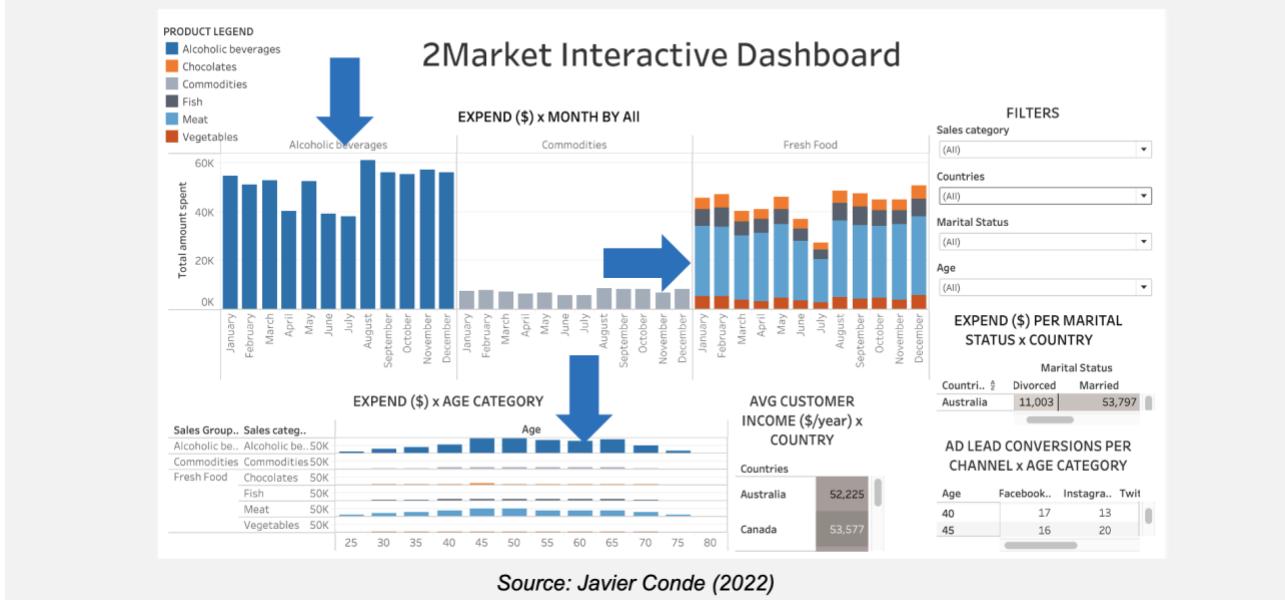
1. Trend across all product categories and almost every country: customer expenditure decreases during summer months with an increase in September/October, slow decreasing again until end of the year (e.g., USA and Spain, Figure 4.1 below). This may suggest a seasonal expenditure pattern to be researched further, helpful to plan seasonal discounts/marketing actions to increase profits and margins



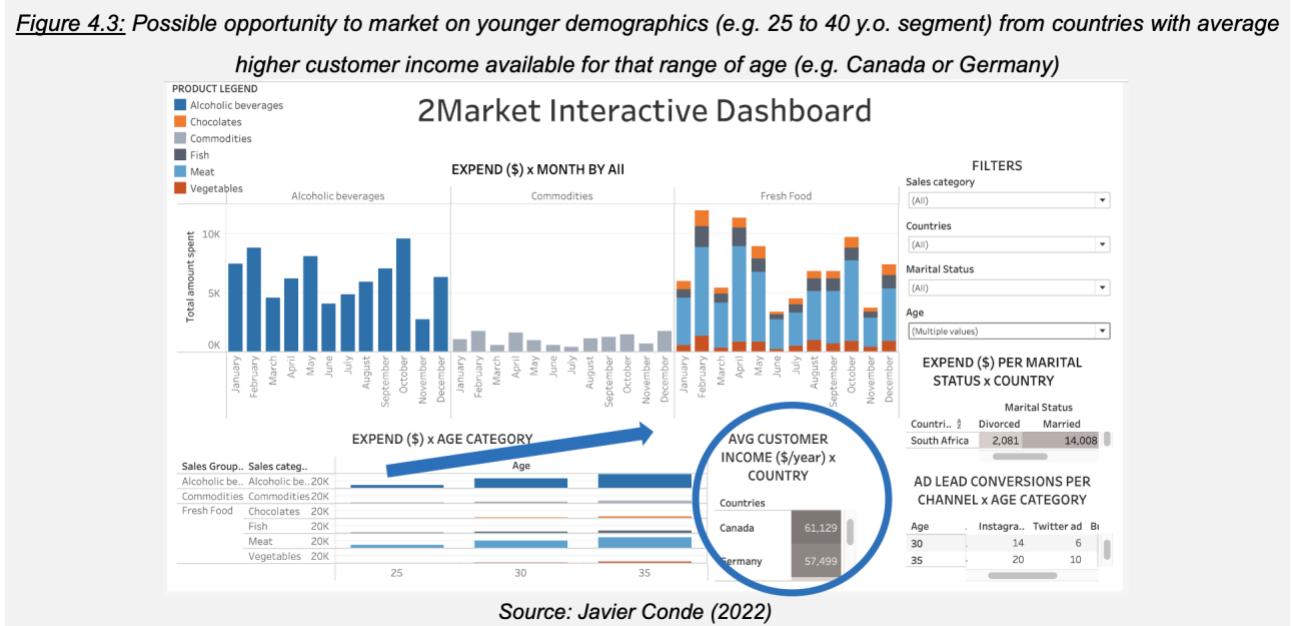
Source: Javier Conde (2022)

2. Confirming the finding during SQL analysis: alcoholic beverages and meat products emerge are best-selling products globally. Particularly popular among 45 to 60 y.o. customer segments (Figure 4.2 below). An opportunity is visible to consider tailored promotions through social media, maybe geographically/ locally targeted (on Twitter and Instagram, also identified previously as most successful advertising channels, supported by regular bulk mailing)

Figure 4.2: Alcoholic beverages and meat products best-sellers globally particularly among 45 to 60 y.o. customer segment



3. There also may be an unexplored opportunity to reach other customer profiles and attract a younger demographic. The dashboard unveils countries with higher customer income available for a range of age between 25 and 40 y.o. (e.g. Canada or Germany) with increasing expending power (Figure 4.3 below).



Two last recommendations for 2Market: taking initiatives to expand the data available to more recent years (increasing the forecasting potential of this dashboard) and

being extremely vigilant (and increase when possible) about the quality of their data: reducing their current ratio of 9.2% duplicated records would boost noticeably the accuracy of this 2Market dashboard.



# Reference List

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