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BUSINFO 706

ANALYSING CUSTOMER
BEHAVIOUR IN A MULTICHANNEL
GIFT RETAILER

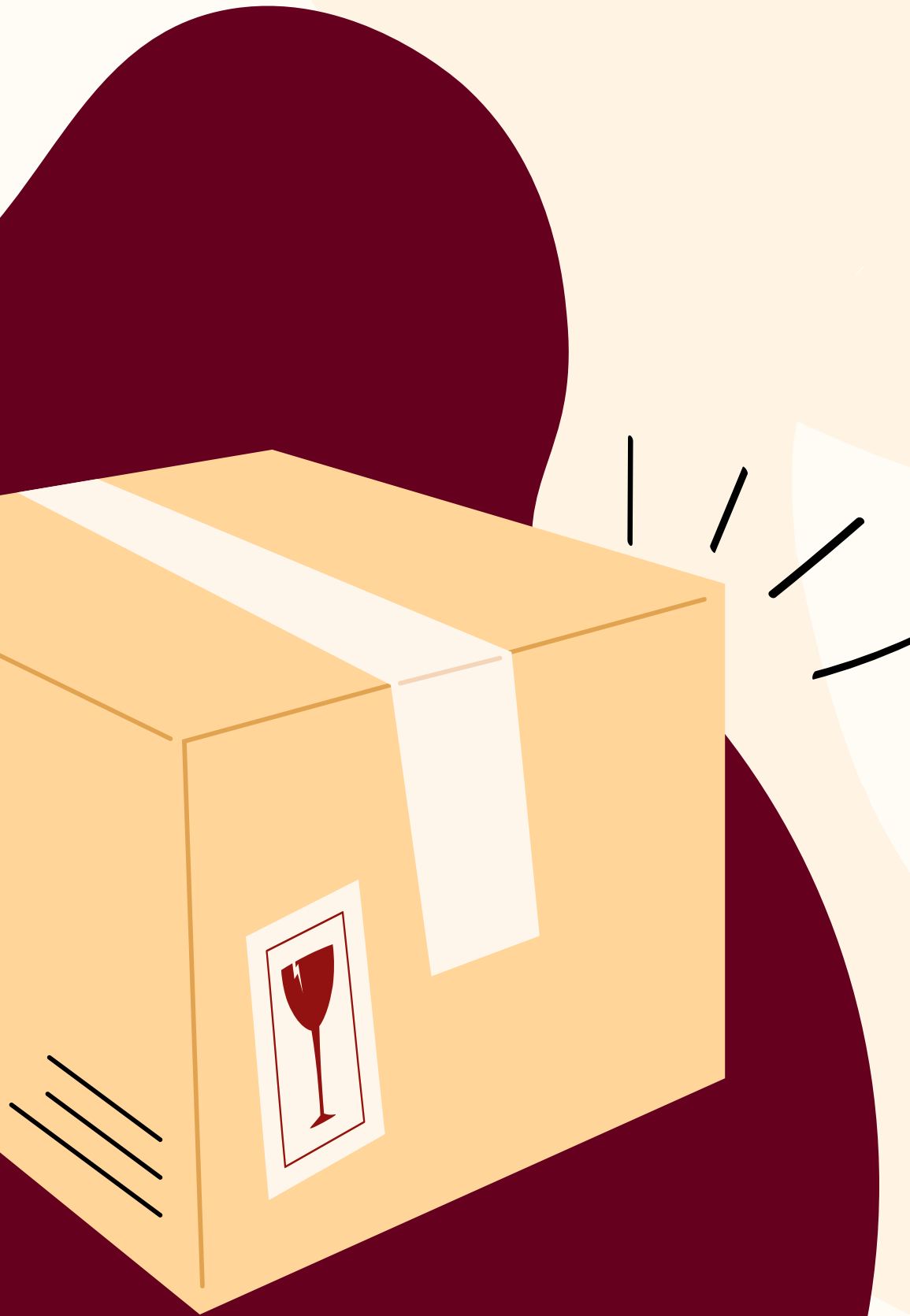
SHREYA MURALEEDHARAN SWAPNA



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CASE OVERVIEW

- National multichannel gift company.
- Food products purchased as gifts.
- 100,051 customer records.
- Rich details on first purchase, acquisition date, store distance, and household attributes.
- Tracks gift vs. non-gift sales and gift recipients by season.





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MARKETING CHALLENGES



A very competitive marketplace for Christmas season gifts



Customer relationship management, including contact management, across multiple channels



Generating business during the non-Christmas months of the year



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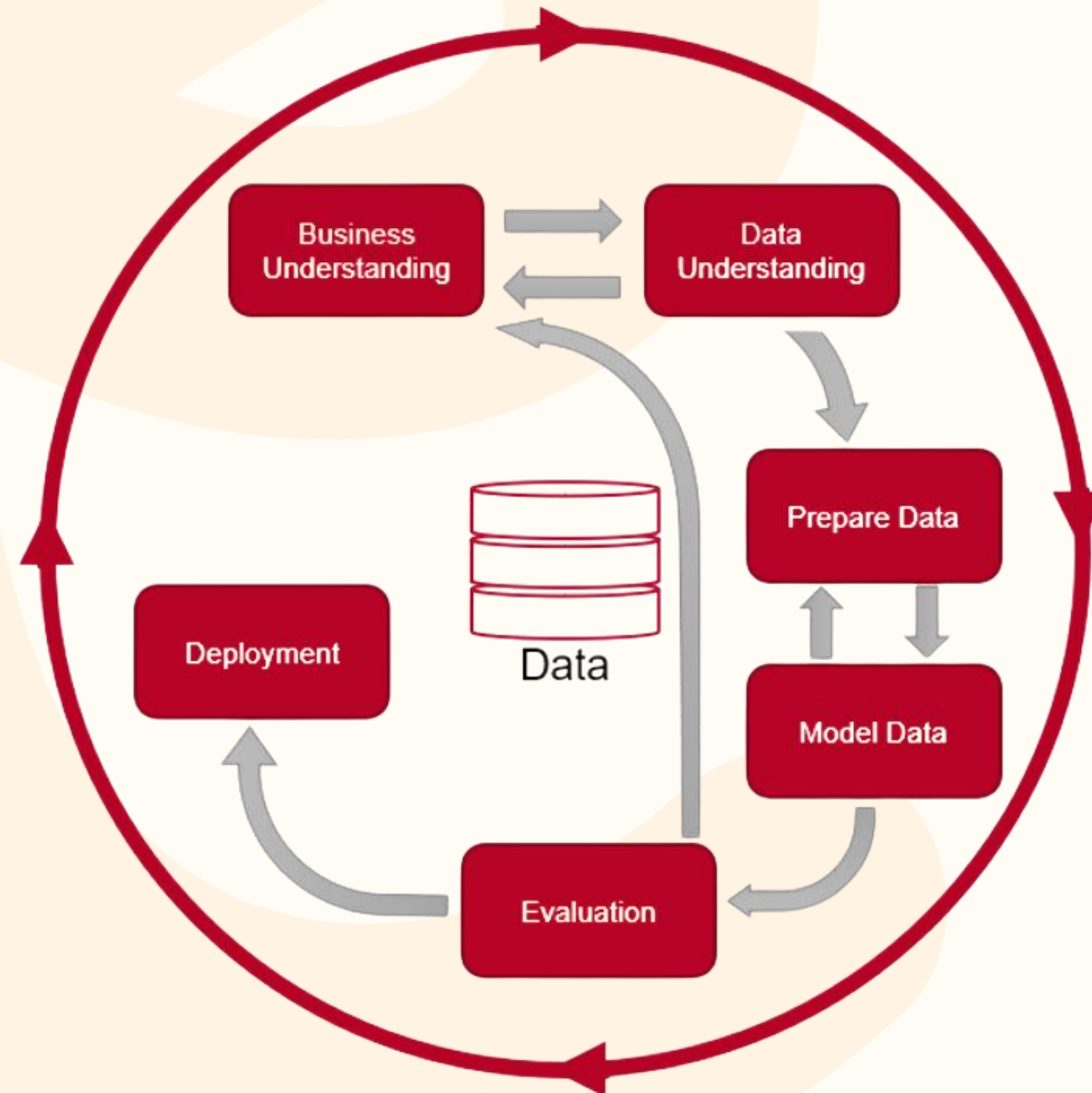
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CRISP-DM FRAMEWORK

Start with business objectives and analyze the dataset to uncover patterns.

Apply findings to guide strategy and decision-making.



Test model accuracy and ensure alignment with business needs.

Clean and transform data, then build predictive models for insights.

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PROBLEM STATEMENT + KPI's

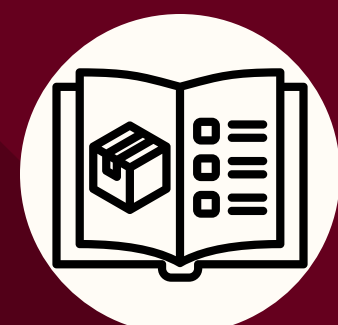
To leverage customer data across channels to predict purchasing behavior, build effective segments, and guide marketing strategies, with success measured through higher customer retention, increased campaign response, and sustainable revenue growth.



Total_Lifetime_Dollars



Int_TotalGift



Cat_TotalOrders



StoreDist_bin

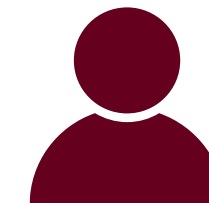


TotalGiftRec

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Channel loyalty or switching over time

To examine how initial channel of purchase is predictive of channel usage for subsequent purchases. The period 2001 – 2007 covered by the sales data was one in which the Internet channel matured and became a large part of the company's sales. Retail channel usage depends to a large extent on distance to a retail store.

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DATA PREPARATION



OBJECTIVE

- Assess channel loyalty vs switching between 2004 and 2007.
- Test if a customer's first purchase channel predicts their final purchase channel.
 - Understand the role of store distance as the Internet channel gained prominence.



DATASET OVERVIEW

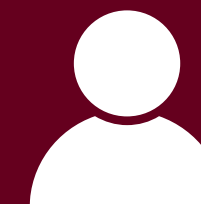
- Source: DMEF customer transactions (2001–2007).
- ~100k customers, covering Retail, Internet, and Catalog spend.
 - Variables include transaction history by season/year, customer demographics, psychographics, and store distance.
- Missing values in income, age, and store distance were imputed using median-based hierarchies.
- Data reshaped into tidy format for channel/year analysis.



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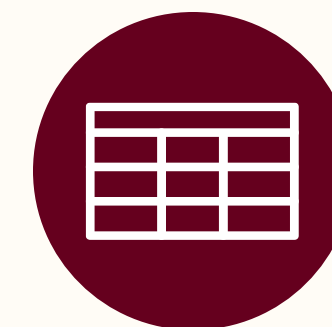
How We Measured Loyalty & Switching



Tracked customers' main purchase channel over time (2004 to 2007).



Tracked changes in main channel year by year to see how customers moved from one channel to another.



Built a table showing % who stayed loyal vs % who moved to another channel.



A customer's main channel = the one they spent the most money in for that year.



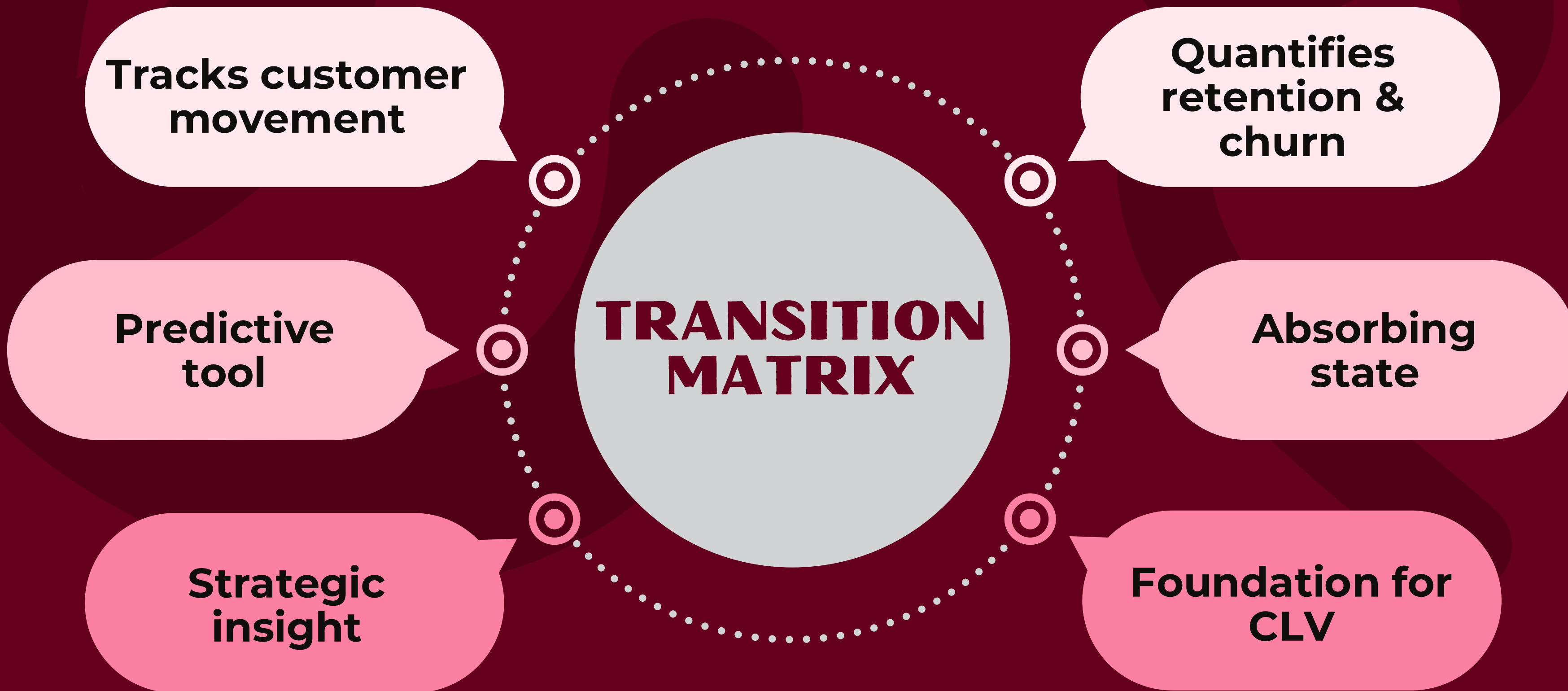
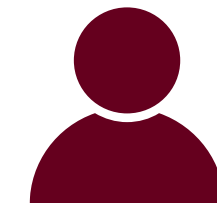
Included only those who purchased in both years.

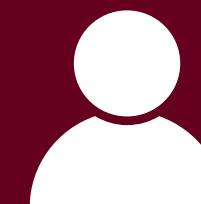


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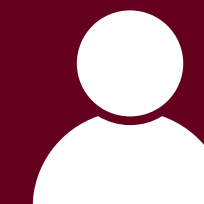


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ANALYSIS

	CATALOG	INTERNET	RETAIL
CATALOG	1858 (78.1)	340 (14.3)	181 (7.6)
INTERNET	191 (14.9)	960 (74.8)	132 (10.3)
RETAIL	161 (6.3)	139 (5.4)	2267 (88.3)

- **Retail: 88.3% retained; only 11.7% switched. Shows strong loyalty.**
- **Internet: 74.8% retained; 14.9% moved to Catalog, 10.3% to Retail. Indicates product or price driven switching.**
- **Catalog: 78.1% retained; 14.3% moved to Internet, 7.6% to Retail. Reflects shift to online convenience.**
- **Highest switching: Internet customers. 25.2% left for other channels.**
- **Main movement pattern: Strong cross shift between Internet and Catalog.**

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Predicting Future Channel Choice

FACTOR	CATALOG VS OTHERS	INTERNET VS OTHERS	RETAIL VS OTHERS
INCREASE IN STORE DISTANCE	Probability rises — customers farther from stores are more likely to choose Catalog.	Probability rises — distance pushes customers toward online (Internet).	Probability falls — greater distance reduces likelihood of in-store purchases.

- *Built a simple model to predict if customers will change channel.*
- *Looked at main channel in 2004 and distance from store.*
- *Predicted main channel in 2007.*
- *Focused on clear patterns, not complex forecasting.*
- *Measured accuracy using AUC (higher = better prediction).*

- *Distance is a major driver of channel choice.*
- *Farther customers shift from Retail toward Internet and Catalog.*
- *Proximity supports Retail loyalty; distance boosts digital and mail-order use.*
- *Past purchases matter, but distance is a consistent predictor.*
- *Strong model accuracy (AUC 0.863) confirms reliability.*

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Store trade area effects and impacts on all channels

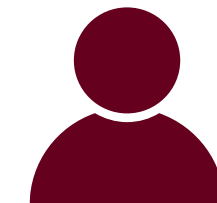
How does a customer's distance from the nearest store affect their retail spending, channel preferences (Retail, Internet, Catalog), and demographic or psychographic profile?



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DATA PREPARATION



DATASET

99,000+ customer records with purchase history, demographics, and distance to store.



DISTANCE GROUPS

0–10 km, 11–20 km, 21–30 km, 31+ km.



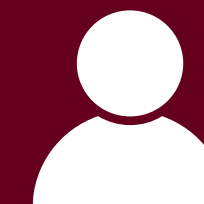
SPEND METRICS

Lifetime spend (Retail, Internet, Catalog, 2004–2007) & new profile features (Has Child, Indoorsy, Outdoorsy, Pet Owners, Luxury, Wellness & Lifestyle).

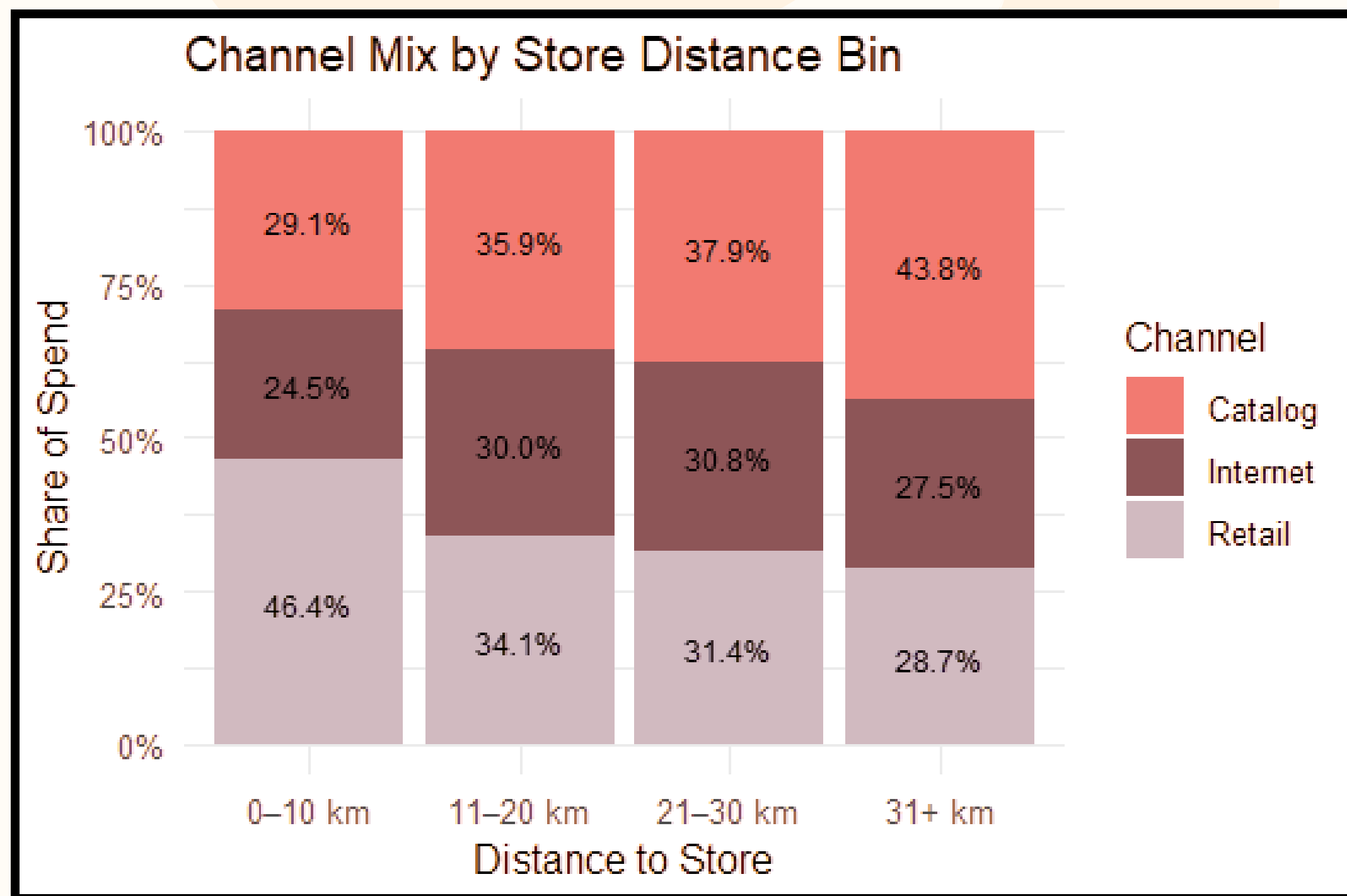


DATA CLEANING

Skipped rows with missing values, as the proportion was very small.

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Channel Mix by Store Distance



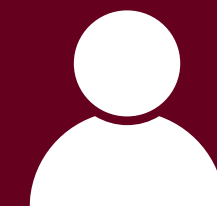
- **Objective:** Understand how purchase channel preference changes as customers live farther from a store.
- **Trend:** Retail share drops from ~46% (0-10 km) to ~29% (31+ km).
- **Catalog:** Share rises from ~29% (0-10 km) to ~44% (31+ km).
- **Internet:** Relatively stable between 24-31% across all distances.
- **Insight:** Customers farther away shift spend from Retail to Catalog, while Internet remains consistent.



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Psychographic Profiles by Store Distance

PROFILE VARIABLES	0-10 KM	11-20 KM	21-30 KM	31+ KM
HasChild	23.8	23.6	22.9	23.2
Indoorsy	16.4	16.1	17.0	18.1
Luxury Lifestyle	15.8	15.3	15.5	16.2
Outdoorsy	17.8	17.8	18.1	20.0
PetOwner	13.5	14.0	13.9	16.4
WellnessLifestyle	20.2	19.3	19.6	20.6

- **HasChild:** Stable at ~23% across all distance groups.
- **Indoorsy:** Gradual rise from 16.4% (0–10 km) to 18.1% (31+ km).
- **LuxuryLifestyle:** Small increase from 15.8% to 16.2% as distance grows.

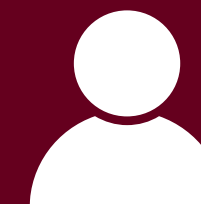
- **Outdoorsy:** Increases from 17.8% to 20.0% in the farthest group.
- **PetOwner & WellnessLifestyle:** Pet ownership grows 13.5% → 16.4%; wellness peaks at 20.6% for 31+ km.



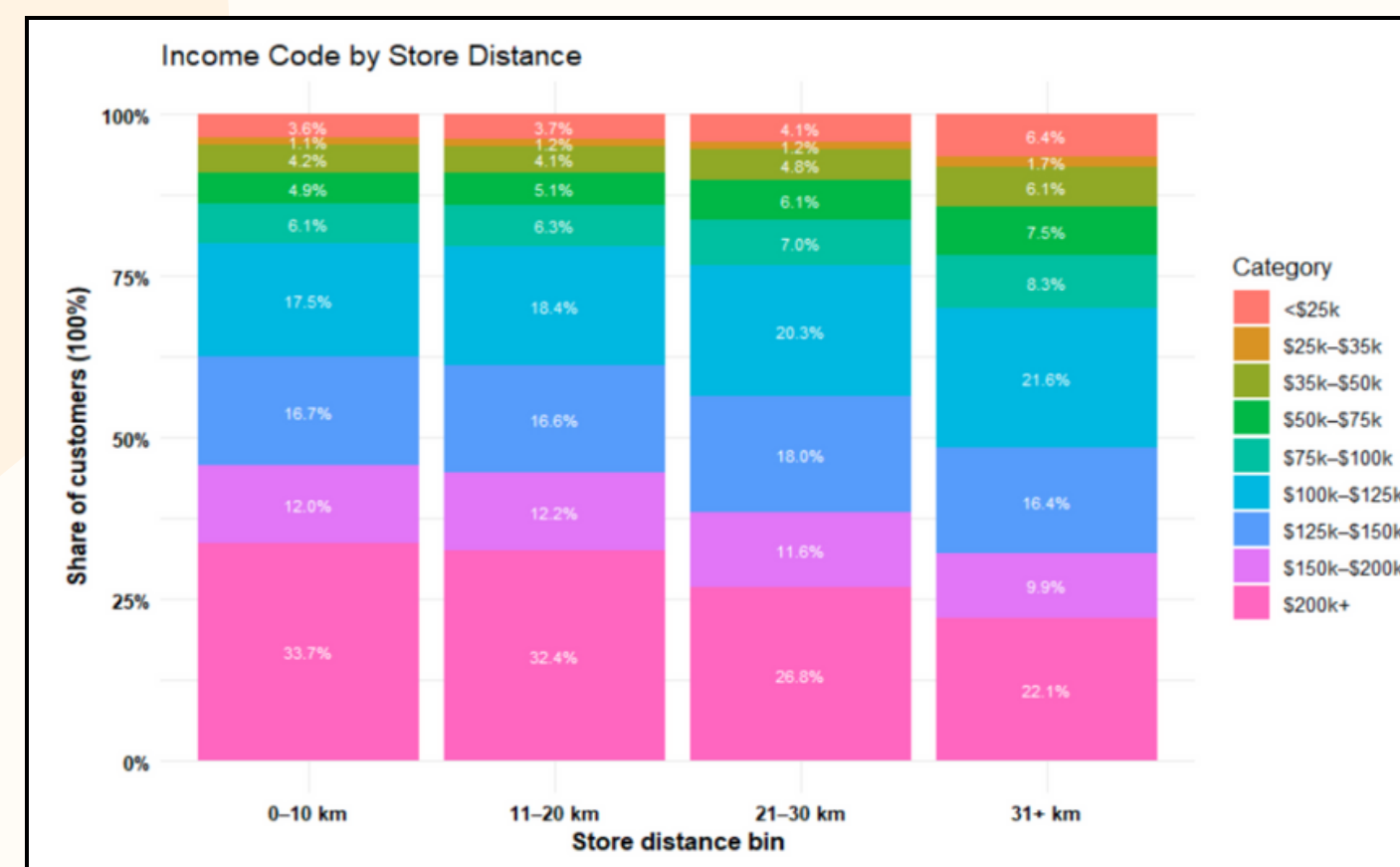
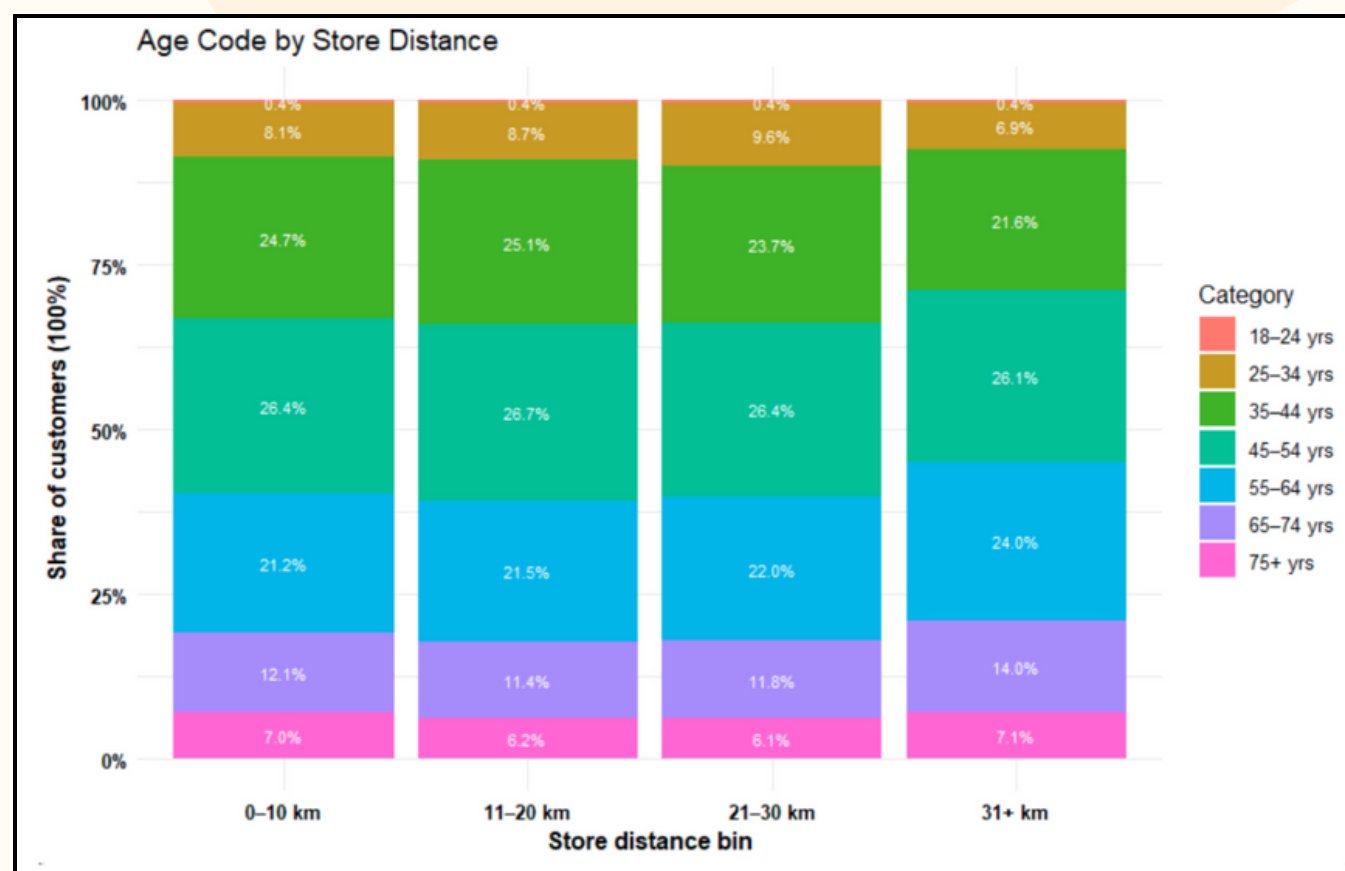
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Demographic Profiles by Store Distance(AGE AND INCOME)



Age:

- **Age distribution is stable across all distances.**
- **Middle-aged groups dominate, making up ~24-27% in every segment.**

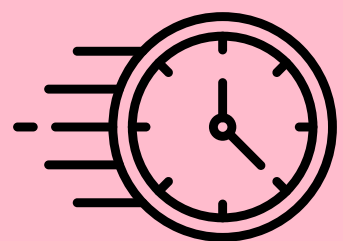
Income:

- **Income: Higher-income categories are less common at 31+ km (top band drops from 33.7% to 22.1%).**
- **Lower-income growth: Category 5-7 share increases slightly with distance.**
- **Customer composition: Majority across all distances are mid-income, mid-age households.**
- **Implication: While age mix is consistent, income skews lower as store distance increases.**

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RFM MODEL

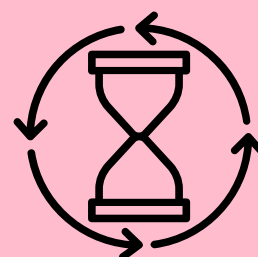
RECENCY



Recency measures how recently a customer made their last purchase.

(25)

FREQUENCY



Frequency measures how often a customer makes purchases.

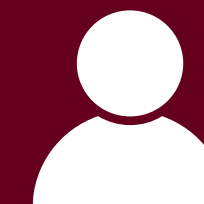
(25)

MONETARY



Monetary measures how much a customer spends overall.

(50)

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RFM & ANOVA – Purchase Behaviour by Store Distance

StoreDist_bin	avg_recency	avg_frequency	avg_monetary	avg_RFM_Total
0-10 km	13.4	14.0	31.4	58.8
11-20 km	13.0	13.3	31.1	57.3
21-30 km	13.0	12.9	30.7	56.6
31+ km	12.9	13.1	30.5	56.5

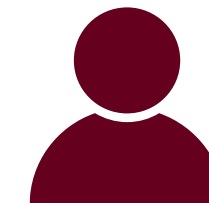
- **Recency:** Most recent purchases are from 0–10 km customers (13.4), least recent from 31+ km (12.9).
- **Frequency:** Highest purchase frequency for 0–10 km (14.0), lowest for 21–30 km (12.9).
- **Monetary:** Average spend per customer is highest for 0–10 km (\$31.4) and lowest for 31+ km (\$30.5).
- **Overall RFM score:** Strongest for 0–10 km (58.8), weakest for 31+ km (56.5).

ANOVA significance ($p < 0.001$): Distance to store influences channel spend — nearby customers spend up to \$28 more in Retail, while distant customers spend up to \$10 more in Catalog.

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Gift giving behaviour consistency and predictability

Since Christmas season gift giving is a large part of this company's business, gift and non-gift revenue is reported separately for the Internet and catalog channels. (The company's retail systems do not identify gift and non-gift sales). Also, the number of distinct gift recipients is provided by season; a separate count of new gift recipients by season is provided as well. Customers may be segmented by how much of their purchasing is for gift purposes.

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DATA PREPARATION



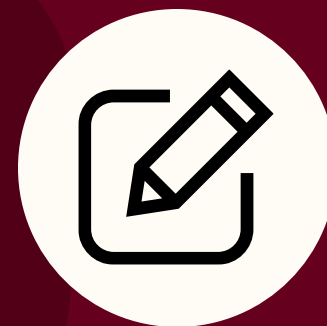
CLEANING

Removed Spring & Retail channel data.
Capped extreme outliers at the 99th percentile.



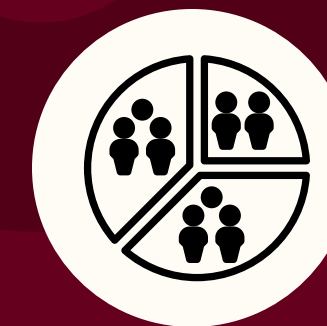
MISSING VALUES

Imputed Store Distance with the median.



FEATURES CREATED

Totals for Internet & Catalog gift spend, orders, lines.
Total recipients & new recipients.
Store Distance and VIP flag (top 1% customers).



DEMOGRAPHICS

Age band, length of residence, and store distance used for profiling.



FINAL DATASET

~30K gifter customers prepared for clustering.



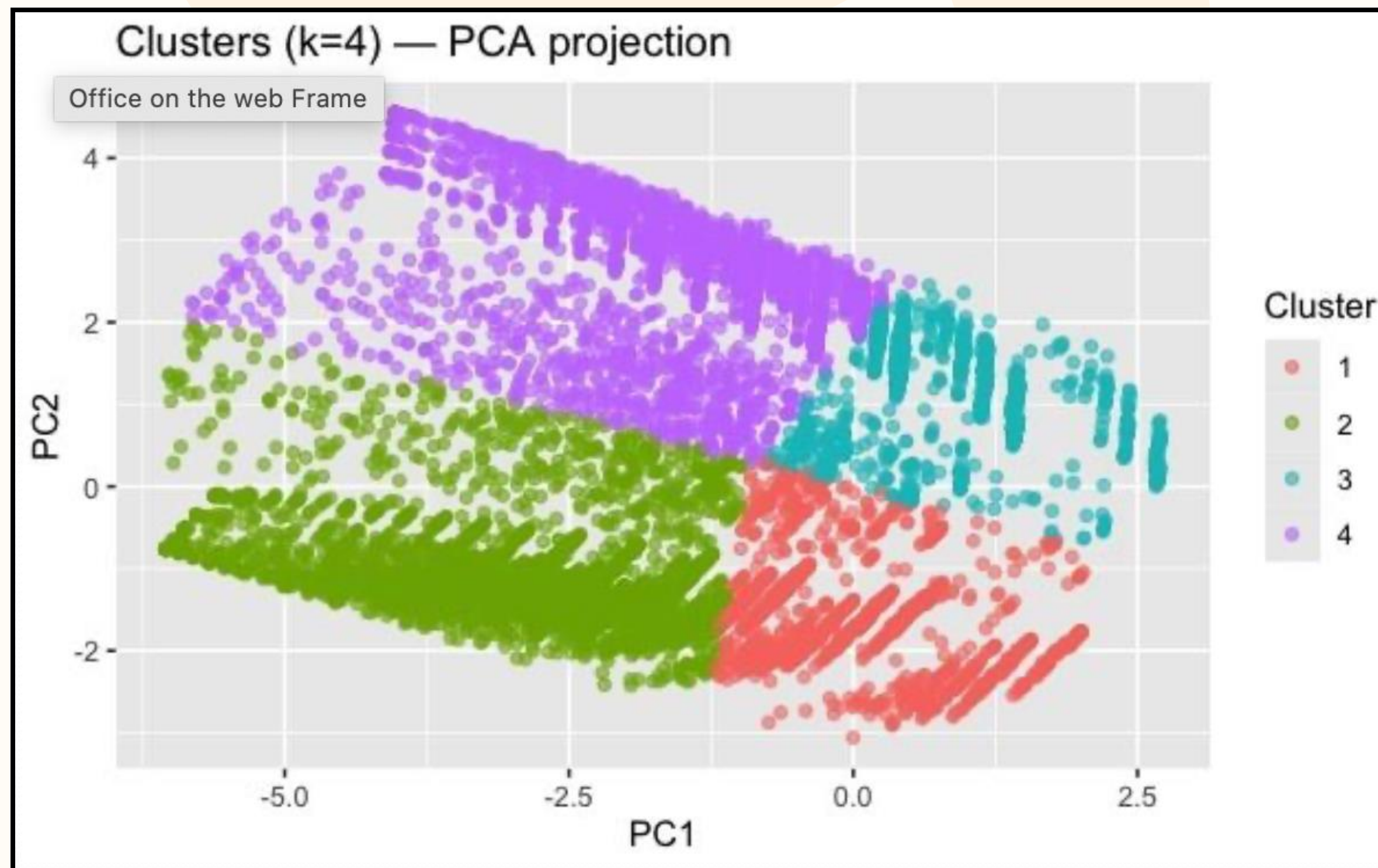
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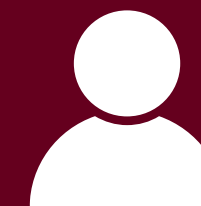
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ANALYSIS



***SILHOUTLETTE
SCORE
=
0.5142461***

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CLUSTER ANALYSIS



CLUSTER 1: – OCCASIONAL CATALOG SHOPPERS

- All_TotalGift \approx 53 \rightarrow very low spend.
- Internet spend = 0, Catalog spend \approx 52.
- ~1 order, ~1 line.
- StoreDist \approx 20.
- VIP share \approx 0.2%

👉 Rare gifters, very small baskets, catalog-only, lowest value segment.



CLUSTER 2 – CATALOG CHAMPIONS

- All_TotalGift \approx 215 \rightarrow highest catalog spend.
- Internet spend = 0, Catalog spend \approx 206.
- ~2 orders, ~6 lines.
- StoreDist \approx 20.4.
- VIP share \approx 12.3%.

👉 Heavy catalog spenders, consistent, loyal, and medium-high value.



CLUSTER 3 – ONLINE EXPERIMENTERS

- All_TotalGift \approx 44 \rightarrow small overall spend.
- Internet spend \approx 44, Catalog spend = 0.
- ~1 order, ~1 line.
- StoreDist \approx 18.6.
- VIP share \approx 0.2%.

👉 Low-engagement gifters, experimenting with the Internet channel, minimal value.



CLUSTER 4 – DIGITAL POWER BUYERS

- All_TotalGift \approx 186 \rightarrow strong spend overall.
- Internet spend \approx 172, Catalog spend = 0.
- ~2 orders, ~5 lines.
- StoreDist \approx 18.2.
- VIP share \approx 13.5%.

👉 High-value gifters, exclusively online, bigger baskets, most engaged and VIP-heavy.

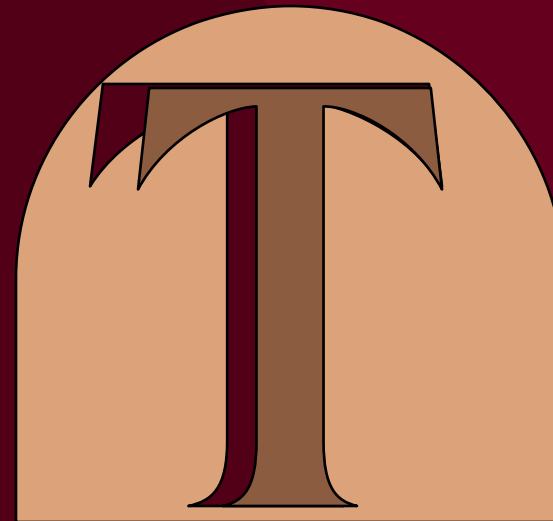
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STP ANALYSIS



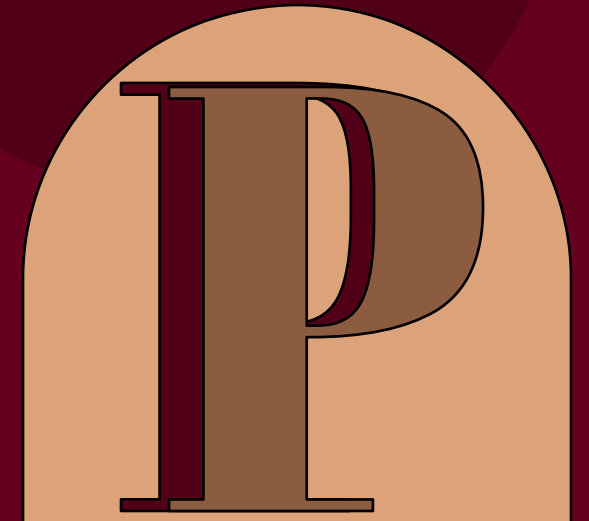
SEGMENTATION

Divide the market into groups based on demographics, behavior, or needs.



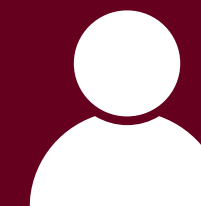
TARGETING

Select the most attractive segments that align with business goals.



POSITIONING

Craft a clear value proposition to occupy a distinct place in the customer's mind.

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DEMOGRAPHICS



CLUSTER 1: – OCCASIONAL CATALOG SHOPPERS

- AgeCode = 5 → older age band.
- LengthRes \approx 10 yrs → long-settled households.
- StoreDist \approx 20.3 → moderate distance from store.

👉 Older, stable customers who stick with catalog.



CLUSTER 2 – CATALOG CHAMPIONS

- AgeCode = 5 → older age band (similar to C1).
- LengthRes \approx 11 yrs → longest-settled of all clusters.
- StoreDist \approx 20.5 → farthest from stores.

👉 Very stable, older households — entrenched catalog users.



CLUSTER 3 – ONLINE EXPERIMENTERS

- AgeCode = 3 → relatively younger (middle-aged).
- LengthRes \approx 7 yrs → shorter residence, less rooted.
- StoreDist \approx 18.3 → closer to stores.

👉 Younger, more mobile customers beginning to try Internet gifting.



CLUSTER 4 – DIGITAL POWER BUYERS

- AgeCode = 4 → mid-to-older age band (younger than catalog clusters).
- LengthRes \approx 7 yrs → less settled, like Cluster 3.
- StoreDist \approx 17.9 → closest to stores.

👉 Mid-aged, less rooted households, closest to stores, strong digital adopters.

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Purchasing by season effects

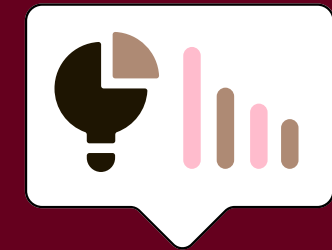
Since sales peak in Fall/Christmas, how much do customers also buy in Spring, and do Spring buyers show distinct channel or demographic characteristics?

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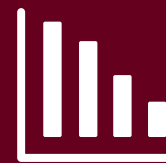
PROBLEM STATEMENT

Problem: Seasonality Risk in Sales

- Current State : Sales peak heavily in Fall/Christmas → high revenue concentration, risk from seasonality.
- Gap: Spring sales occur, but their size and buyer traits are unclear.



How much do customers spend in Spring vs Fall?



Are Spring buyers different in demographics ?



Can STP (Segmentation–Targeting–Positioning) reduce reliance on Christmas sales?

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APPROACH

Data Preparation

- Derived Spring/Fall spend (2004–2007)
- Built the Seasonality index :
 $\text{Spring Spend} \div (\text{Spring} + \text{Fall Spend})$

Exploratory Analysis

Seasonality distribution, channel mix, demographics.

Modelling

Logistic regression (Spring buyer ~ Age, Income, Store Distance, First Channel).

STP Framework

Segments defined → Target high-potential groups → Position tailored campaigns.

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ANALYSIS

Channel Usage

SEASON	RETAIL	INTERNET	CATALOG
Fall	42%	32%	27%
Spring	61%	26%	19%



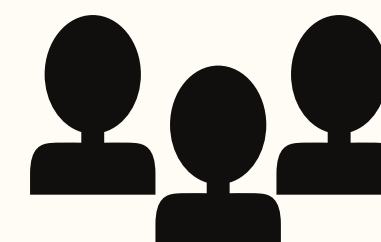
Demographics

- Spring buyers live closer (~18 miles), --> Convenience-driven shoppers
- Higher home values → More urban + affluent



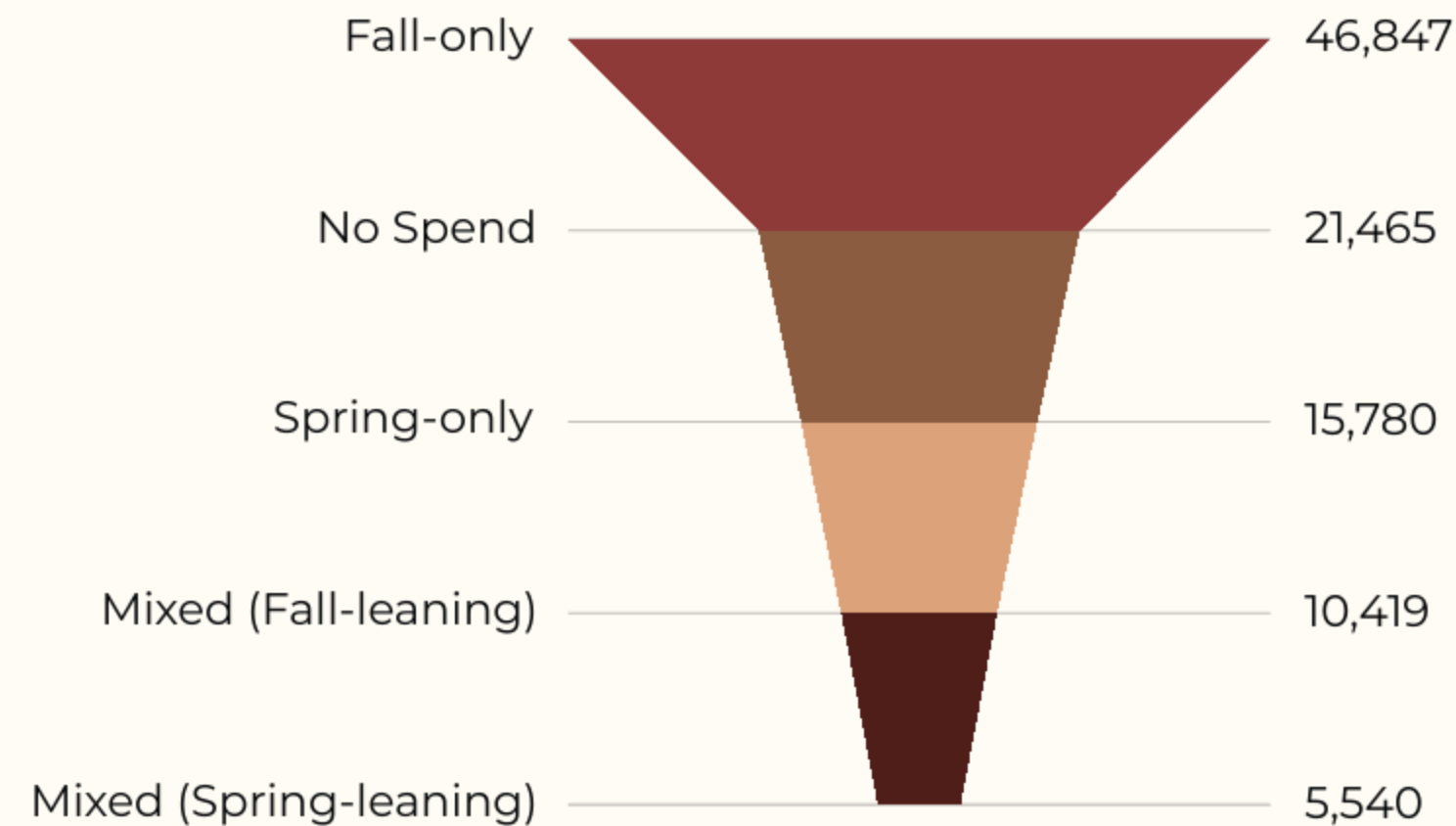
Logistic Model

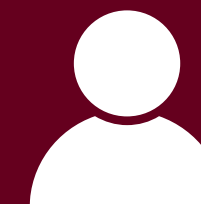
- Age ↑ Spring likelihood ($p < 0.01$).
- Store distance ↓ Spring likelihood ($p < 0.001$).
- First Channel: Internet & Retail starters = more Spring buyers.
- Income: Not significant.
- Spring purchases driven by proximity + digital-first, not income.



10,0051
Customers

Seasonality



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STP STRATEGY



Segmentation

- Fall-only (47%) – core Christmas buyers
- Spring-only (16%) – off-season buyers
- Mixed (16%) – dual-season buyers
- No Spend (21%) – inactive



Targeting

- Fall-only + Fall-leaning (57%) → biggest headroom for Spring conversion
- Retain Spring-only with loyalty programs
- Cross-sell to Mixed buyers across both seasons



Position

- Fall-only → Catalog at Christmas, Spring promos online/retail
- Spring-only → Internet as year-round convenience
- Mixed → Bundled offers across both seasons

How to boost sales ?



Launch Spring Internet campaigns (Easter, Mother's Day)



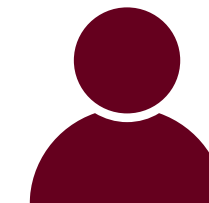
Incentivize Fall-only buyers to try Spring offers (discounts, rewards)



Promote Spring sales in areas near stores (proximity targeting)



Track customer movement: Fall-only → Mixed → Spring

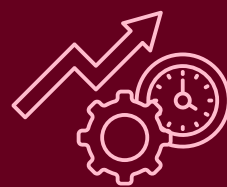
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RECOMMENDATIONS



EXPAND REACH

Use online and catalog channels to target customers farther from stores, ensuring convenient access to gifting products.



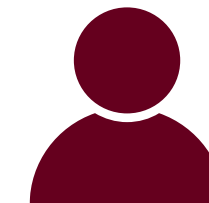
MAXIMIZE LOCAL FOOTFALL

Offer exclusive in-store experiences, limited editions, and event-based promotions for nearby customers.



PRODUCT MIX OPTIMIZATION

Align inventory with local demographics — e.g., wellness and premium gifts in affluent areas, family-oriented bundles in younger communities.

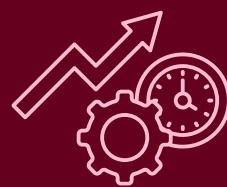
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RECOMMENDATIONS



SEASONAL REVENUE PUSH

Run targeted campaigns during peak gifting seasons, differentiating messaging for local and distant customers.



BUILD LOYALTY ACROSS CHANNELS

Create programs that reward both in-store and online purchases to encourage repeat gifting.



BOOST SALES

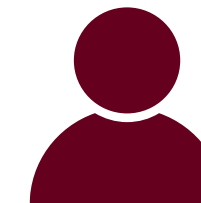
Boost sales with targeted seasonal campaigns (e.g., Easter, Mother's Day), discounts for off-season buyers, proximity-targeted store sales, and tailored customer movement tracking.



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