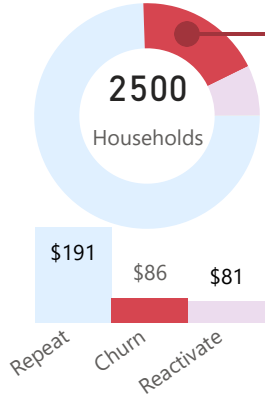# Understanding churn households & its impact

Why are churn households needed to be considered?

As of Nov 2002,

2500 Households

$191 — Repeat
$86 — Churn
$81 — Reactivate

Churn at their last transaction
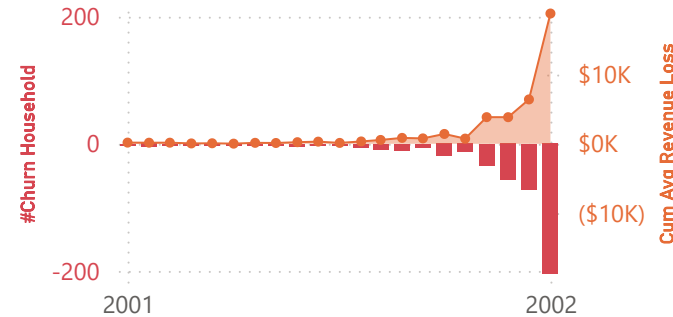
18.24% of all households

456 #households

$39,189.83 Total Avg monthly revenue from households

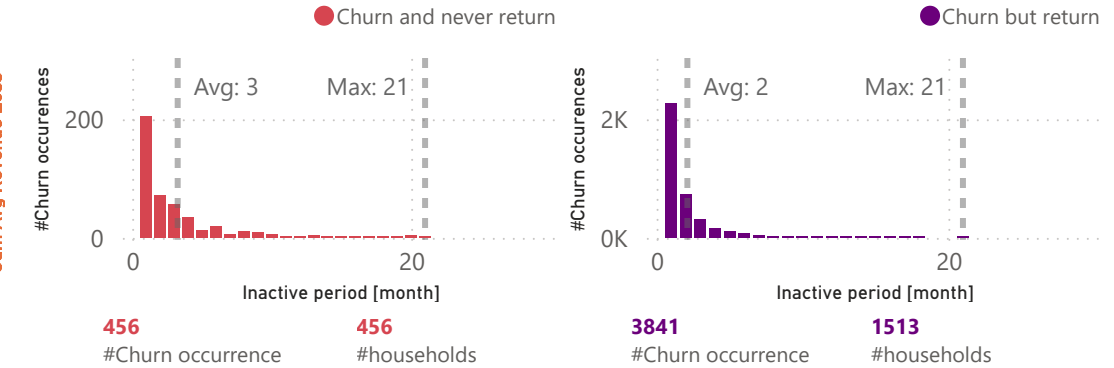**$85.94** Avg monthly revenue per household

How much revenue has been lost over time as more households churn and not return?

#Churn Household / Cum Avg Revenue Loss

200 / $10K
0 / $0K
-200 / ($10K)
2001 — 2002

How long customers remain inactive before coming back or not returning at all?

● Churn and never return   ● Churn but return

Avg: 3   Max: 21 (red histogram)
Avg: 2   Max: 21 (purple histogram)

#Churn occurences — Inactive period [month]

456 — #Churn occurrence   456 — #households
3841 — #Churn occurrence   1513 — #households

If there's a chance to call back the households that have last status as churn ?

Status of their last transaction   **Overall status from historical purchases**

Churn-Non-returning Churn:46

Churn

Churn-Returned After Churn:410   Returned After Churn

What are the customer values (Average monthly revenue per household) for each status?

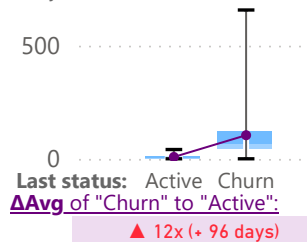| Overall status\Last transaction status	Churn	New	Reactivate	Repeat	Total
Consistent Active		$106.36		$260.85	$260.68
Non-returning Churn	$159.40				$159.40
Returned After Churn	$77.70		$80.80	$118.95	$103.21
Total	$85.94	$106.36	$80.80	$190.58	$163.52

How do the purchasing behavior of households having churn at their last transaction look like?

Household RFM Segments

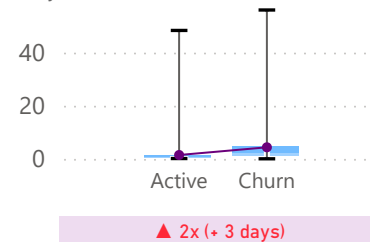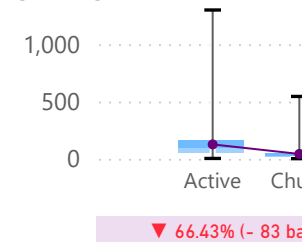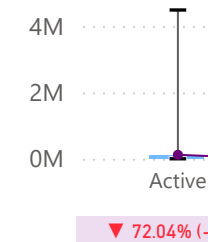**Regular Minimal Spenders**   Quiet ...   Sleepi...

70.18%   13.16%   12.72%

R: Month-to-date Recency [Days]
500 / 0
Last status: Active — Churn
ΔAvg of "Churn" to "Active": ▲ 12x (+ 96 days)

F: Mean Time Between Purchase [Days]
40 / 20 / 0
Active — Churn
▲ 2x (+ 3 days)

F: Total Basket Frequency [Baskets]
1,000 / 500 / 0
Active — Churn
▼ 66.43% (- 83 baskets)

M: Total Quantity [Units]
4M / 2M / 0M
Active — Churn
▼ 72.04% (- 86,487 units)

M: Total Revenue [$]
10K / 0K
Active — Churn
▼ 67.91% (- $1,958.35)
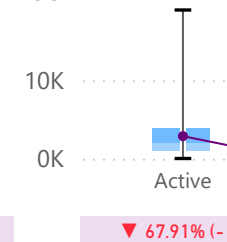
Transaction behavior	#Churn households	%#Churn households	#All households	%Churn to all households	Avg monthly revenue per household	Avg monthly revenue	%Avg monthly revenue
Regular Minimal Spenders	320	70.18%	1620	19.75%	$84.76	$27,122.62	69.21%
Balanced Buyers	16	3.51%	622	2.57%	$313.03	$5,008.46	12.78%
Quiet Low Spenders	60	13.16%	60	100.00%	$77.90	$4,673.84	11.93%
Sleeping Star Customers	58	12.72%	98	59.18%	$23.80	$1,380.27	3.52%
Shining Star Customers	2	0.44%	100	2.00%	$502.32	$1,004.64	2.56%
Total	456	100.00%	2500	18.24%	$85.94	$39,189.83	100.00%

Filter pane

Transaction behavior ⌄
- ☐ Select all
- ☐ Balanced Buyers
- ☐ Quiet Low Spenders
- ☐ Regular Minimal Spenders
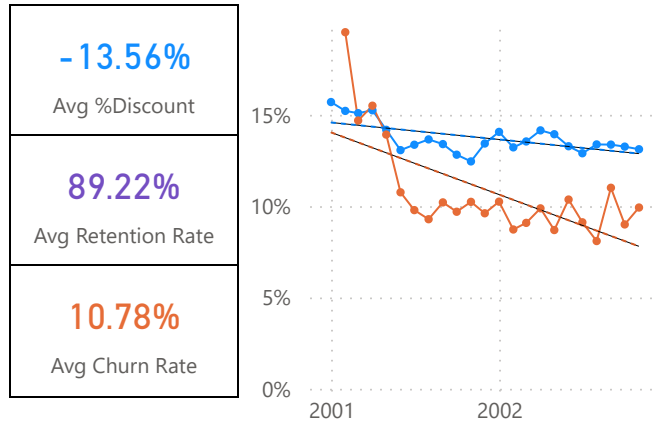- ☐ Shining Star Customers
- ☐ Sleeping Star Customers

Overall Historical Status ⌄
- ☐ Select all
- ☐ Consistent Active
- ☐ Non-returning Churn
- ☐ Returned After Churn

Churn In Last purchase? ⌄
- ☐ Select all
- ☐ Active in last transaction
- ☐ Churn in last transaction

Tips: *Interpreting effect plots*

Use the plot to compare means across groups and assess the significance of differences, focusing on the overlap of confidence intervals (CI) and how far the means differ:
- If CI **overlap**, there may have no significant effect between the group levels of this metrics.
- If CI **don't overlap**, the metric has a different effect on each group level.

As of Nov 2002,

● Avg %Disc ● Avg %Churn

-13.56%
Avg %Discount

89.22%
Avg Retention Rate

10.78%
Avg Churn Rate

🔒 Used sales promotion?   🔒 Sales promo usage type:

#items in transactions
2,536,111

Used sales promotion
1,288,175
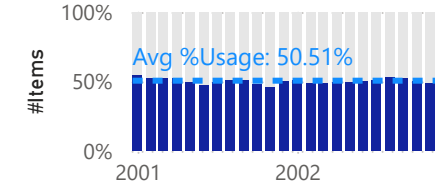
Not used sales promotion
1,247,936

Used retail loyalty program
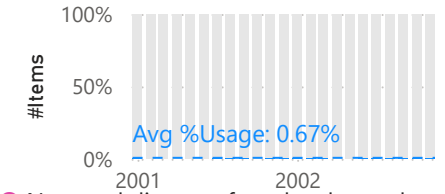1,270,383

Used loyalty prog & manu..
10,625

Used manufacturer coupon
6,476

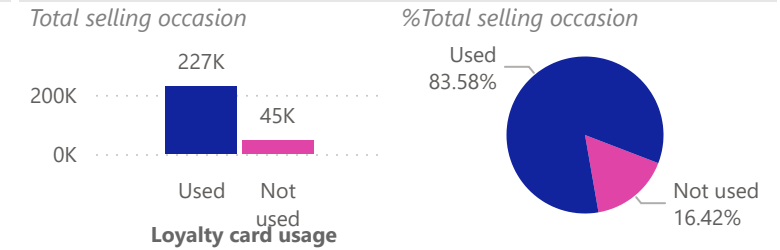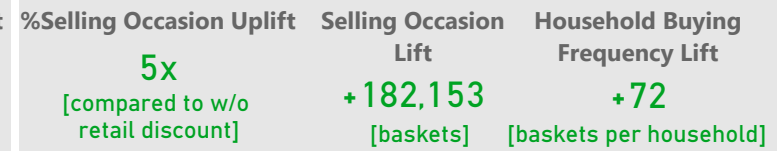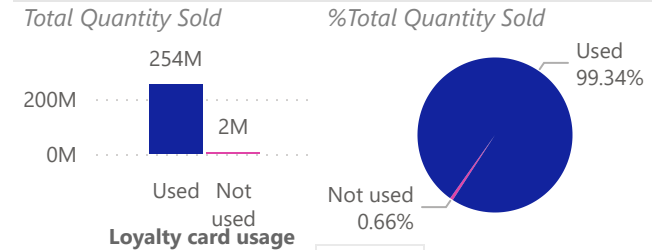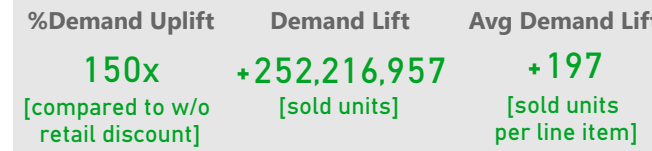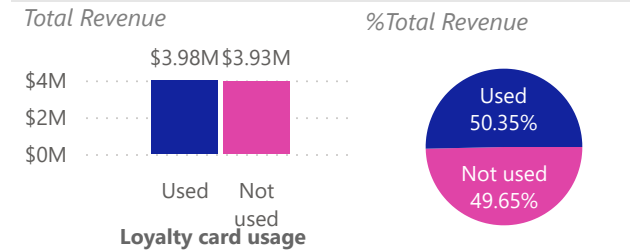Used giveaway promotion
691

Discount usage from Loyalty card
Avg %Usage: 50.51%

Discount usage from Manu' coupon
Avg %Usage: 0.67%

How can retail loyalty discounts drive business and customer metrics?

Given: ● Used discount from loyalty card, ● Not used discount from loyalty card

%Revenue Uplift	Revenue Lift	Avg Revenue Lift	%Demand Uplift	Demand Lift	Avg Demand Lift	%Selling Occasion Uplift	Selling Occasion Lift	Household Buying Frequency Lift
+1.40%	+$54,895.98	-$0.02	150x	+252,216,957	+197	5x	+182,153	+72
[compared to w/o retail discount]		[per line item]	[compared to w/o retail discount]	[sold units]	[sold units per line item]	[compared to w/o retail discount]	[baskets]	[baskets per household]

Total Revenue   *%Total Revenue*   *Total Quantity Sold*   *%Total Quantity Sold*   *Total selling occasion*   *%Total selling occasion*

$3.98M $3.93M

Used 50.35%
Not used 49.65%

Loyalty card usage

254M   2M

Used 99.34%
Not used 0.66%

Loyalty card usage

227K   45K

Used 83.58%
Not used 16.42%

Loyalty card usage

What and how business and customer metrics were affected by retail discount significantly at [99% ⌄] confidence level (α)?

Given: ● Mean, − − − Grand Mean

Revenue Effect Plot   *Revenue Box Plot*   *Demand Effect Plot*   *Demand Box Plot*   *Buying Frequency Effect Plot*   *Buying Frequency Box Plot*

Grand Mean: $3.12/item   Max: 500 840   Grand Mean: 101 units/item   Grand Mean: 91 baskets per hh   Max: 959 502

3.14 3.13
3.12
3.11
3.10
3.08

Used / Not used
Loyalty card usage

198 / 1

Used / Not used
Loyalty card usage

91 / 19

Used / Not used
Loyalty card usage

Remark

- Permanent Churn Level of each household (hh) is determined based on their historical purchase status.

	Permanent Churn Lv.	Historical status
100%	High	Non-returning Churn
50%	Medium	Returned After Churn
0%	Low	Consistent Active

- Each segment hh value:

Buying behavior > Perm. Churn Lv	Avg Monthly Revenue/hh
Balanced Buyers	**$294.45**
Low	$299.80
Medium	$270.61
High	$319.58
Quiet Low Spenders	**$77.54**
Medium	$74.59
High	$89.32
Regular Minimal Spenders	**$98.57**
Low	$118.67
Medium	$92.19
High	$134.02
Shining Star Customers	**$588.82**
Low	$600.55
Medium	$464.91
High	$377.23
Sleeping Star Customers	**$24.06**
Medium	$23.95
High	$29.41
Total	**$163.49**

Given:

- Ant. (Antecedent) refers to the product purchase first in each basket or transaction.
- Cons. (Consequent) refers to the product purchase later in each basket or transaction.

Filter pane

- Ant. Product — All
- Ant. Prod. Levels — All
- Ant. Prod. Manufacturer — All
- Ant. Prod. Brand — All
- Cons. Product — All
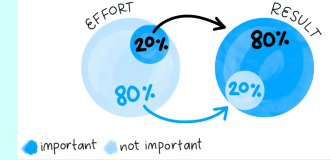- Cons. Prod. Levels — All
- Cons. Prod. Manufactur... — All
- Cons. Prod. Brand — All

Tips: *Pareto Principle*

- This principle suggests that *a small proportion of inputs* or actions are *responsible for the majority of results*.
- The ratio in the Pareto Rule is not fixed and can vary by the situation.
- Default ratio is 80/20: 20% of causes or items that contribute to 80% of the outcome or problem.

Setting parameter pane

Please set Δ% (ranging between -1 [-100%] to +1 [100%]) for computing each measure **target** from last year by each scenario that you aims to.

Example: Given **Amount** from last year is **100 unit**.
If %Δtarget of that amount from last year was set at +5%, then
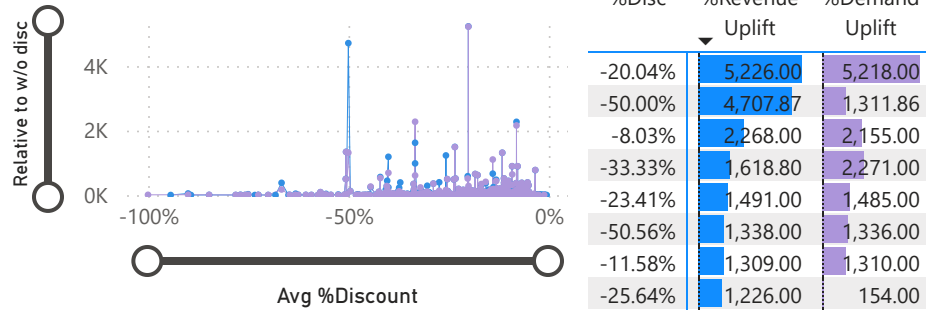**Target = (1+0.05)(100) = 105 unit.**

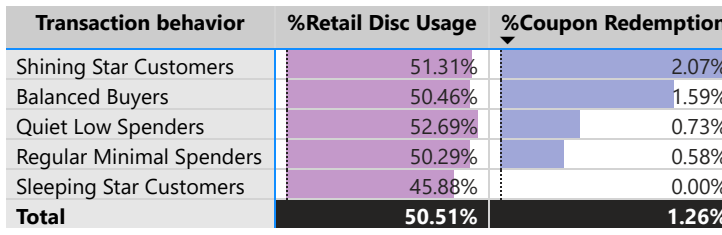**Δ%Target of Revenue** — 10%

Δ%Target of Quantity sold — 35%

How to optimize discounts and where to take action for maximum business impact?
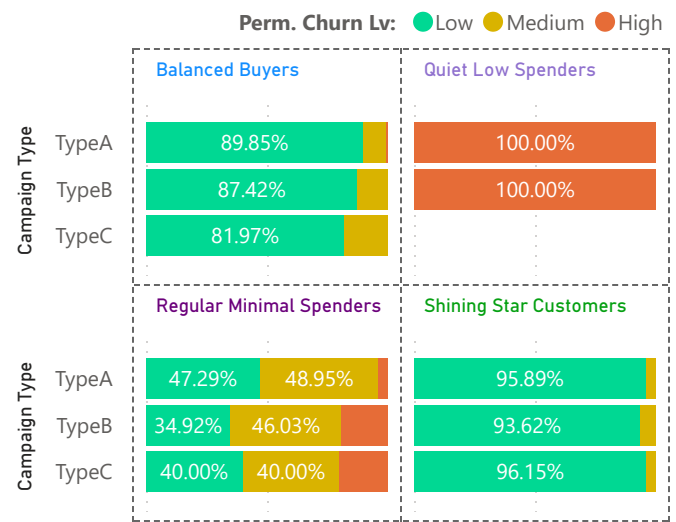
Discount level and Uplift

%Disc	%Revenue Uplift	%Demand Uplift
-20.04%	5,226.00	5,218.00
-50.00%	4,707.87	1,311.86
-8.03%	2,268.00	2,155.00
-33.33%	1,618.80	2,271.00
-23.41%	1,491.00	1,485.00
-50.56%	1,338.00	1,336.00
-11.58%	1,309.00	1,310.00
-25.64%	1,226.00	154.00

Click + to drill down more granular levels of product details:
Main Product Category >> Department >> Commodity >> Sub-commodity >> ProductID

Demand Pattern	Avg %Discount	%Retail Disc Usage	%Revenue Uplift	%Demand Uplift
Erratic	-20.30%	60.03%	62.95%	176.28%
Lumpy	-18.55%	58.62%	42.18%	229.92%
Intermittent	-12.00%	48.62%	-21.26%	896.20%
Smooth	-8.36%	39.41%	69.64%	89693.05%

Which household segments present high potential for reengagement?

Responsiveness of each RFM segment on sales promotion

Transaction behavior	%Retail Disc Usage	%Coupon Redemption
Shining Star Customers	51.31%	2.07%
Balanced Buyers	50.46%	1.59%
Quiet Low Spenders	52.69%	0.73%
Regular Minimal Spenders	50.29%	0.58%
Sleeping Star Customers	45.88%	0.00%
Total	**50.51%**	**1.26%**

% Total line item having Retail discount usage
- Balanced Buyers 48.65%
- Regular Minima... 37.26%
- 13...

% Total coupons redeemed
- Balanced Buyers 60.8%
- Shining... 21.7%
- Regu... 17.4%

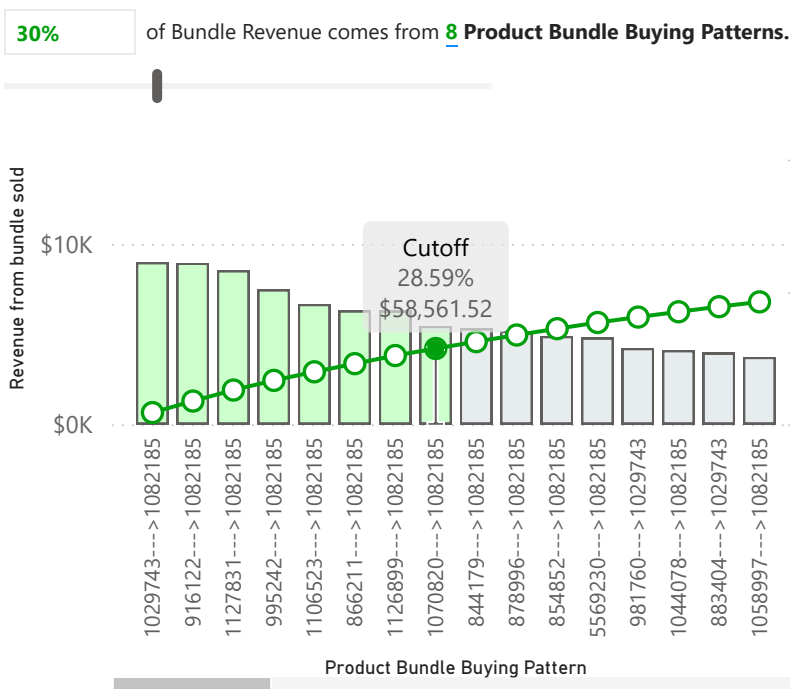*Household value vs. Engagement Metrics*
(Balanced Buyers / Quiet Low Spen...)

How to personalized promotions to boost repeat purchases?

Identify priority campaign types based on permanent churn level

Perm. Churn Lv: Low / Medium / High

Balanced Buyers
Campaign Type	
TypeA	89.85%
TypeB	87.42%
TypeC	81.97%

Quiet Low Spenders
| TypeA | 100.00% |
| TypeB | 100.00% |

Regular Minimal Spenders
TypeA	47.29% / 48.95%
TypeB	34.92% / 46.03%
TypeC	40.00% / 40.00%

Shining Star Customers
TypeA	95.89%
TypeB	93.62%
TypeC	96.15%

Identify high potential for churn reduction from #Churn occurrences before and after the campaign period

Campaign Type	Campaign	Balanced Buyers High	Balanced Buyers Medium	Balanced Buyers Low	Regular Minimal Spenders Medium	Shining Star Customers High
TypeA	8	100.00%	66.67%	0.00%	100.00%	
	13	100.00%	33.33%	0.00%	58.33%	100.00%
	18	100.00%	88.89%	90.00%	80.95%	100.00%
	30		100.00%			100.00%
TypeB	5	100.00%				
	10	100.00%	100.00%			100.00%
	17		100.00%	0.00%		
	19		100.00%			100.00%
	23	100.00%	100.00%			
	24				100.00%	
TypeC	14	100.00%	0.00%			
	15				100.00%	
	20		100.00%			100.00%

Click cell in matrix to filter relevant product & click + to drill down in store detail:

Product	#Cmpgn.
BANANAS (1082185)	56
EGGS - X-LARGE (981760)	24
CELERY (962568)	19
CARROTS MINI PEELED (961554)	17
FLUID MILK (1082185)	16

Prioritize product bundles having a high impact on driving significant revenue

Pareto Analysis of Revenue by product buying patterns

30% of Bundle Revenue comes from **8 Product Bundle Buying Patterns.**

Cutoff 28.59% $58,561.52

Top 20% Revenue-Generating Product Buying Patterns from Market Basket Analysis (Association Rule Mining)
Click the rule in pareto chart to visualize selected product buying patterns
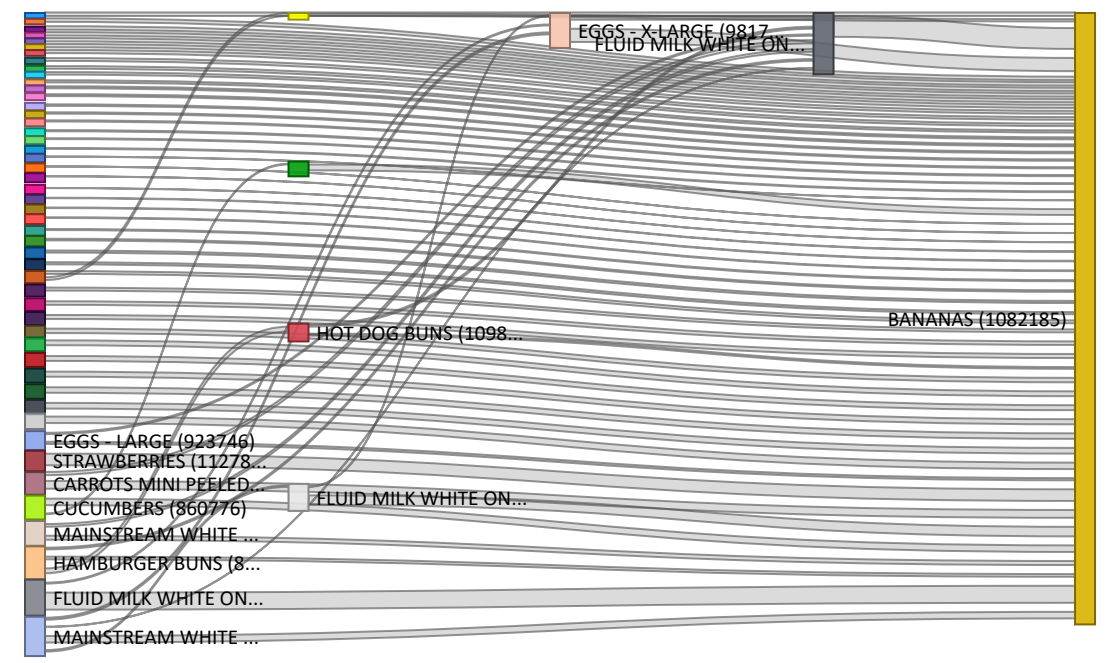
No.	Product Bundle Association Rule	Antecedent Product	Consequent Product	#Applied basket	Confidence	Lift	%Repeat Purchase	Revenue from bundle sold	%Revenue to GT	Cumulative Revenue	%Cumulative Revenue
1	1029743--->1082185	FLUID MILK WHITE ONLY (1029743)	BANANAS (1082185)	3,442	23.89%	2.22	90.68%	$8,972.46	4.38%	$8,972.46	4.38%
2	916122--->1082185	CHICKEN BREAST BONELESS (916122)	BANANAS (1082185)	1,319	29.92%	2.77	88.44%	$8,939.75	4.36%	$17,912.21	8.74%
3	1127831--->1082185	STRAWBERRIES (1127831)	BANANAS (1082185)	2,347	44.58%	4.13	88.32%	$8,522.43	4.16%	$26,434.64	12.90%
4	995242--->1082185	FLUID MILK WHITE ONLY (995242)	BANANAS (1082185)	2,987	23.84%	2.21	89.94%	$7,461.88	3.64%	$33,896.51	16.55%
5	1106523--->1082185	FLUID MILK WHITE ONLY (1106523)	BANANAS (1082185)	2,099	21.44%	1.99	90.34%	$6,652.37	3.25%	$40,548.88	19.79%
6	866211--->1082185	GRAPES WHITE (866211)	BANANAS (1082185)	1,644	45.20%	4.19	87.79%	$6,292.43	3.07%	$46,841.32	22.86%
7	1126899--->1082185	FLUID MILK WHITE ONLY (1126899)	BANANAS (1082185)	1,735	38.72%	3.59	87.93%	$6,280.99	3.07%	$53,122.31	25.93%
8	1070820--->1082185	FLUID MILK WHITE ONLY (1070820)	BANANAS (1082185)	1,622	36.55%	3.39	87.68%	$5,439.22	2.66%	$58,561.52	28.59%
9	844179--->1082185	PRIMAL (844179)	BANANAS (1082185)	961	24.39%	2.26	89.20%	$5,303.07	2.59%	$63,864.59	31.17%
10	878996--->1082185	GRAPES RED (878996)	BANANAS (1082185)	1,545	43.07%	3.99	88.25%	$5,168.52	2.52%	$69,033.11	33.70%
11	854852--->1082185	TOMATOES HOTHOUSE ON THE VINE (854852)	BANANAS (1082185)	1,572	38.60%	3.58	88.64%	$4,874.59	2.38%	$73,907.70	36.08%
12	5569230--->1082185	SOFT DRINKS 12/18&15PK CAN CAR (5569230)	BANANAS (1082185)	976	20.20%	1.87	84.92%	$4,785.20	2.34%	$78,692.89	38.41%
13	981760--->1029743	EGGS - X-LARGE (981760)	FLUID MILK WHITE ONLY (1029743)	1,406	15.42%	2.95	85.05%	$4,209.84	2.05%	$82,902.74	40.47%
14	1044078--->1082185	LEAN (1044078)	BANANAS (1082185)	821	20.26%	1.88	89.12%	$4,092.22	2.00%	$86,994.96	42.46%
15	883404--->1029743	MAINSTREAM WHITE BREAD (883404)	FLUID MILK WHITE ONLY (1029743)	1,283	18.60%	3.56	80.72%	$3,950.35	1.93%	$90,945.31	44.39%
16	1058997--->1082185	FLUID MILK WHITE ONLY (1058997)	BANANAS (1082185)	1,493	36.46%	3.38	87.91%	$3,717.85	1.81%	$94,663.16	46.21%
17	951590--->1029743	MAINSTREAM WHITE BREAD (951590)	FLUID MILK WHITE ONLY (1029743)	994	16.23%	3.11	81.09%	$3,603.01	1.76%	$98,266.16	47.97%
18	951590--->1082185	MAINSTREAM WHITE BREAD (951590)	BANANAS (1082185)	1,746	28.51%	2.64	88.68%	$3,568.90	1.74%	$101,835.06	49.71%

Pinpoint types of Direct Marketing Promotion effective for encouraging repeat purchase (%)

In-Store Display Location	Balanced Buyers	Quiet Low Spenders	Regular Minimal Spenders	Shining Star Customers	Sleeping Star Customers	Total
Not on Display	100.00%	82.00%	99.32%	100.00%	78.65%	98.42%
In-Aisle	99.68%	51.35%	91.80%	99.00%	36.96%	92.48%
Front End Cap	99.68%	41.38%	89.10%	99.00%	28.95%	90.82%
Rear End Cap	99.68%	51.52%	89.04%	99.00%	17.14%	90.76%
Secondary Location Display	99.52%	51.52%	88.63%	99.00%	25.00%	90.29%
Store Rear	98.22%	55.17%	88.77%	100.00%	14.63%	90.07%
Side-Aisle End Cap	95.42%	60.00%	75.94%	100.00%	21.05%	82.39%
Store Front	95.71%	42.31%	77.03%	95.96%	15.63%	82.10%
In-Shelf	91.27%	45.00%	72.36%	98.95%	25.00%	79.26%
Mid-Aisle End Cap	70.54%	50.00%	54.53%	75.68%		61.12%

Direct-Mail Location	Balanced Buyers	Quiet Low Spenders	Regular Minimal Spenders	Shining Star Customers	Sleeping Star Customers	Total
Not on ad	100.00%	75.00%	98.94%	100.00%	66.23%	97.75%
Interior page feature	100.00%	75.00%	99.00%	100.00%	66.67%	97.72%
Front page feature	100.00%	65.96%	97.74%	100.00%	59.42%	96.70%
Back page feature	98.70%	55.56%	85.75%	100.00%	31.25%	88.87%
Wrap front feature	100.00%	47.83%	83.66%	98.00%	8.82%	87.34%
Interior page line item	79.71%	40.00%	43.62%	89.36%		60.23%
Wrap back feature	71.48%	25.00%	36.28%	80.43%		53.37%
Wrap interior coupon	70.32%	14.29%	33.89%	88.17%		51.25%
Free on interior page	46.65%		27.25%	53.42%		38.19%
Free on front page, back page or wrap	19.78%		9.09%	14.81%		14.29%

Click in the class of Display Location / Mailer >> Store >> Product levels to drill down in aspect of Revenue and see more detail of time series pattern.

Store	%ΔVar	Current to Target	Current yr Amount	Target Amount	Amount by date
367	0.14%		140,272	140,075	
406	5.52%		116,453	110,361	
429	19.78%		80,950	67,584	
292	26.59%		75,665	59,773	
343	4.55%		75,130	71,858	
356	7.60%		74,578	69,311	
321	27.77%		68,557	53,658	
31782	16.41%		68,348	58,715	
323	23.99%		67,316	54,291	
381	-12.83%		64,851	74,399	
369	12.72%		64,071	56,838	
384	51.47%		63,154	41,694	
375	-15.22%		62,924	74,218	
Total	**10.00%**		**4,411,547**	**4,010,485**	

Product Category	%ΔVar	Current to Target	Current yr Amount	Target Amount
Travel & Services				
KIOSK-GAS	28.45%		318,573	248,012
AUTOMOTIVE	-1.09%		235	237
Other				
MISC. TRANS.	-45.16%		3,162	5,766
MISC SALES TRAN	29.77%		68,399	52,706
Media & Entertainment				
VIDEO	-100.00%			23
PHOTO	-14.51%		6	7
Marketing & Merchandise				
TOYS	-38.23%		3	5
PROD-WHS SALES	-100.00%			5
GM MERCH EXP	667.25%		90	11

(Actual / Forecast time series: 2001 – 2003, Total Amount 0K–400K)