ANALYTICS
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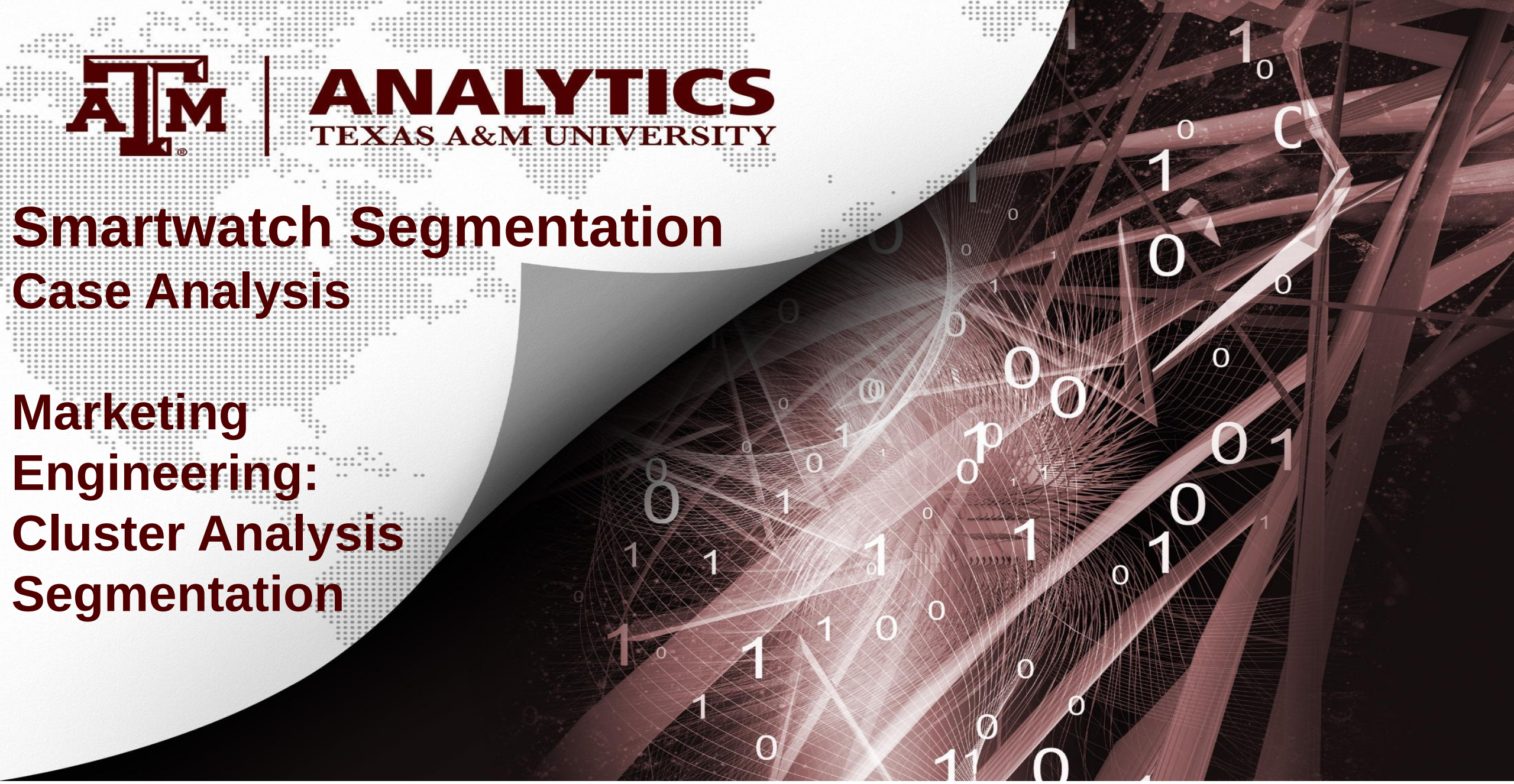
Smartwatch Segmentation Case Analysis

Marketing Engineering: Cluster Analysis Segmentation



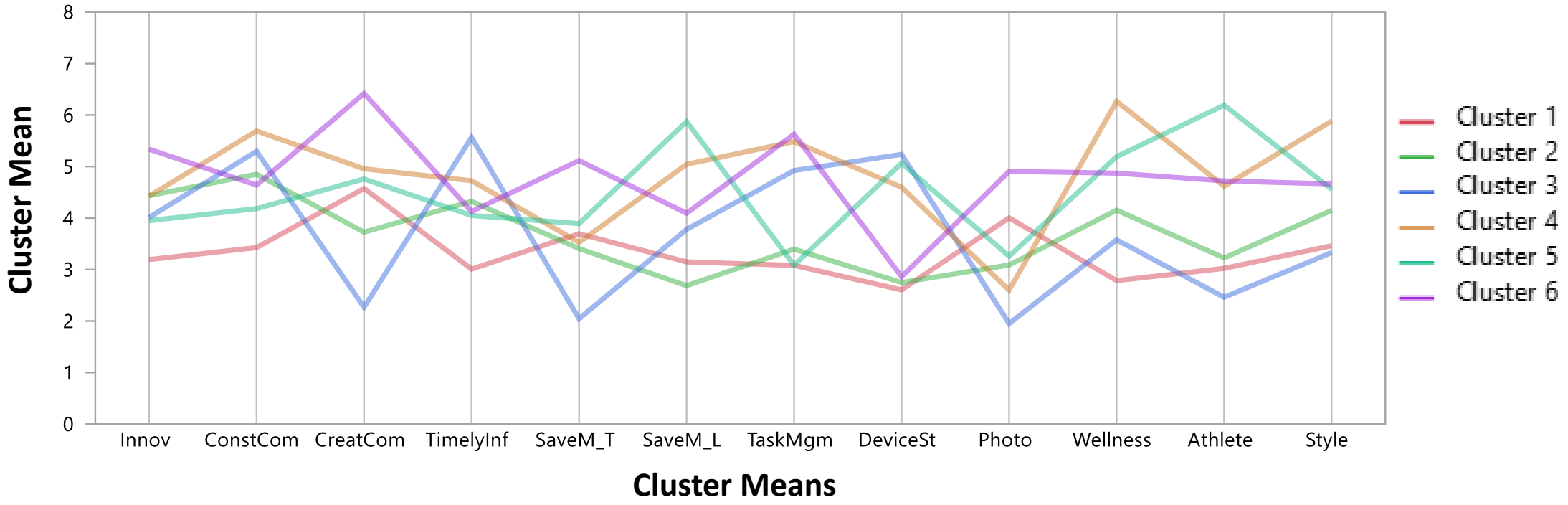
Nathaniel Green's Contributions: Marketing Strategy, Creative Packaging & Cluster Analysis

Smartwatch Segmentation

Index

Question 1: Determine the number of distinct segments present in the market as represented in the current respondent sample

- Six distinct clusters created from Bases towards product attributes and characteristics:
  - Distinct clusters defined on subsequent slides



Question 2: After determining the number of segments, describe each using the segmentation and descriptor variables. Based on the characteristics, create a name for each segment that captures the essence of what makes it unique

Cluster 1 = Media / Socially Focused; **Bases** (Creative Comm., Photos, Save $ Life), **Descriptors** (-'s Company Buy, Income) (+'s Age, Advert, Edu, Retail, TV, Sales, Tech); **16.5% error**

Cluster 2 = Early Market Adopters; **Bases** (Constant Comm., Innovation, Timely Info); **Descriptors** (-'s Income, Company Buy, Degree, Retail, Sales, iPhone, Advert, Snap, Amazon Prime, Construction) (+'s TV, Age); **16.2% error**

Cluster 3 = Work Horses; **Bases** (Timely info, Constant Comm., Device Sturdiness); **Descriptors** (-'s FB Instagram, Snap) (+s Company Buy, Age, Income, News Paper, Construction, SMB, Engineer, Twitter, Sales); **9.8% error**

Cluster 4 = Positive Image; **Bases** (Wellness, Style, Constant Comm.); **Descriptors** (-'s Retail, Age, YouTube, Construction, Advert, Engineer, SMB, Twitter, Tech) (+s iPhone, Degree, FB Instagram, Income, TV); **10.5% error**

Cluster 5 = Active Engaged; **Bases** (Athlete, Save $ Life, Wellness); **Descriptors** (-'s Age, TV, Pod/Radio, News Paper) (+'s Amazon Prime, YouTube, Income, Health); **4.4% error**

Cluster 6 = IoT Youth; **Bases** (Creative Comm., Task Mgt, Innovation); **Descriptors** (-'s Age, Amazon Prime, Income, News Paper, Health Worker, Construction, YouTube) (+'s Snap, TV); **5% error**

Question 3: Rate the attractiveness of each smartwatch segment on a scale of 1-7. Explain the factors that went into your rating.

Segment	Rate	Population Surveyed	Spend per Unit	Bases	Risk
Media / Socially Focused	7	22.3%	$182.29	Creative Communication, Photos, & Save $ Life	Lowest per unit potential spend
Work Horses	6	18.2%	$249.67	Timely Information, Constant Communication, & Device Sturdiness	Company phone barrier
Early Adopters	5	18.2%	$206.37	Constant Communication, Innovation, & Timely Information	Price sensitivity
IoT Youth	4	8.6%	$198.49	Creative Communication, Task Management, & Innovation	Smallest potential segment by population %
Active Engaged	3	12.0%	$187.25	Athlete, Save $ Life, & Wellness	mature/crowded market space
Positive Image	2	20.7%	$240.00	Wellness, Style, & Constant Communication	Segment has high iPhone adoption

Question 4: For each variable used in the segmentation, rate the strength of competitors' offerings, including the Apple Watch, Fitbit Charge 2, and Samsung Gear S3. Identify the segment for which each of these brands is best positioned.

Segmentation Variable Strength (1 - Lowest, 7 - Highest)

	Innovation	Constant Comms	Creative Comms	Timely Info	Save $ Trans	Save $ Life	Task Mgmt	Sturdy	Photos	Well Being	Athlete	Style
WATCH	6	6	6	6	5	1	6	5	4	5	5	5
fitbit charge 2	4	2	2	4	1	1	1	7	1	7	7	6
Samsung GALAXY Gear	6	5	5	6	6	1	5	5	3	5	6	4

Best Segmentation Positioning

WATCH	**Positive Image** (high iPhone adoption, less price sensitive)
fitbit charge 2	**Active Engaged** (focused of fitness capabilities, more price sensitive)
Samsung GALAXY Gear	**Early Adopters** (innovation and timely info)

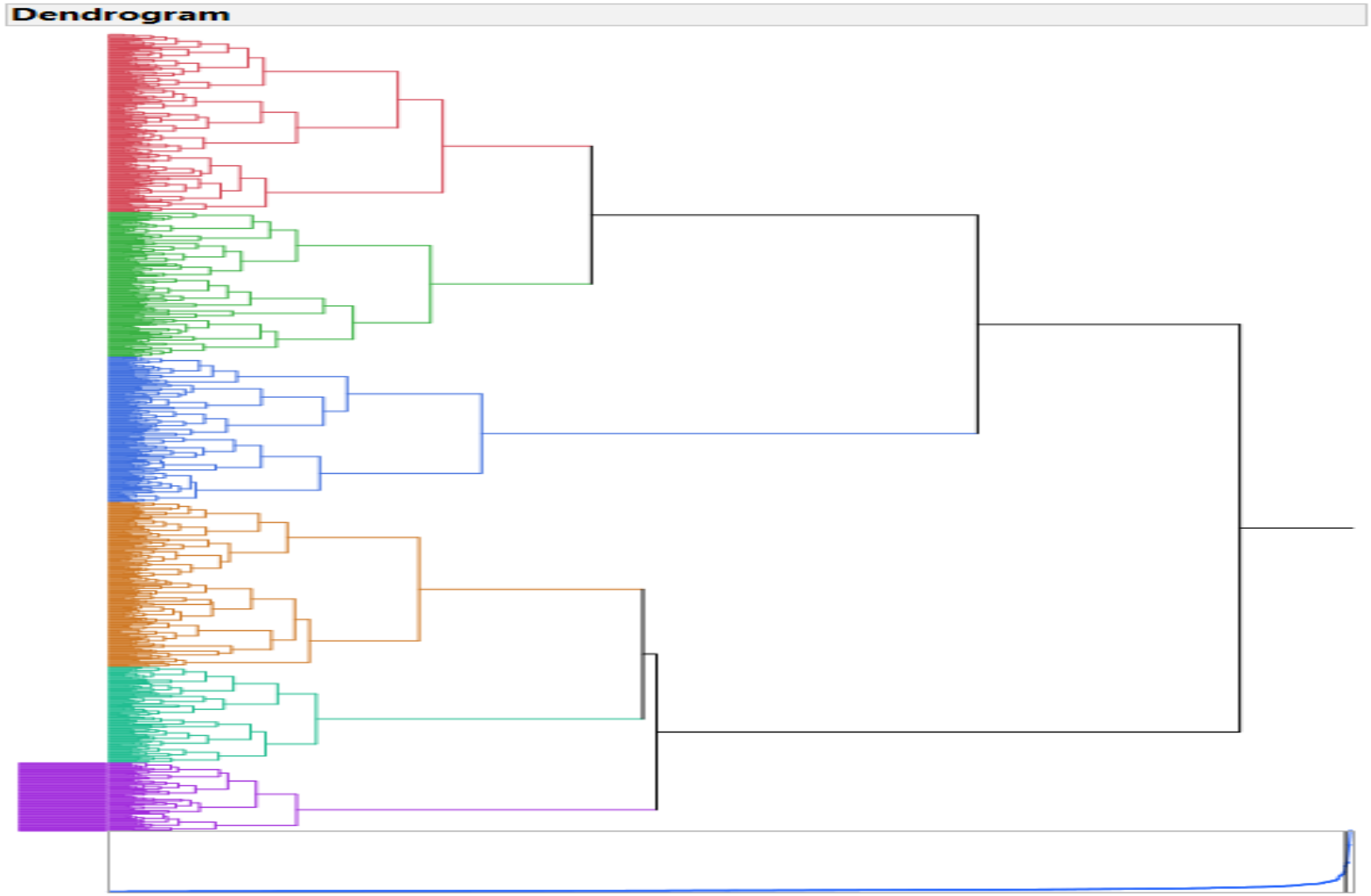
Question 5: Rate Intel's previous watch, the Basis Peak, and a watch developed with Amazon, Aetna, and Google on each of the segmentation variables. Identify the segment(s) you believe is/are Intel's best targets.

Rated on a scale of 1 (lowest) to 7 (highest)

- Google - Ideal Partner
  - Current market placement and the ability to meet a variety of needs to allow targeting multiple segments.
  - Already has a mail client, calendar, tasks, social network, etc.
- Amazon - Second
  - Will need to meet needs through various applications and use of "Alexa"
- Aetna
  - Activity/wellness needs are addressed with currently existing platforms such as FitBit

	Innov	Const Comm	Creat Comm	Timely Info	Save $ Trans	Save $ Life	Task Mgt	Sturdy	Photo	Well	Athle	Style
Basis Peak	5	1	1	1	1	5	1	1	1	5	5	4
Amazon	7	5	4	4	5	7	6	6	5	7	7	6
Google	7	6	6	6	6	7	6	6	6	7	7	6
Aetna	5	1	1	1	1	7	1	5	1	7	7	6

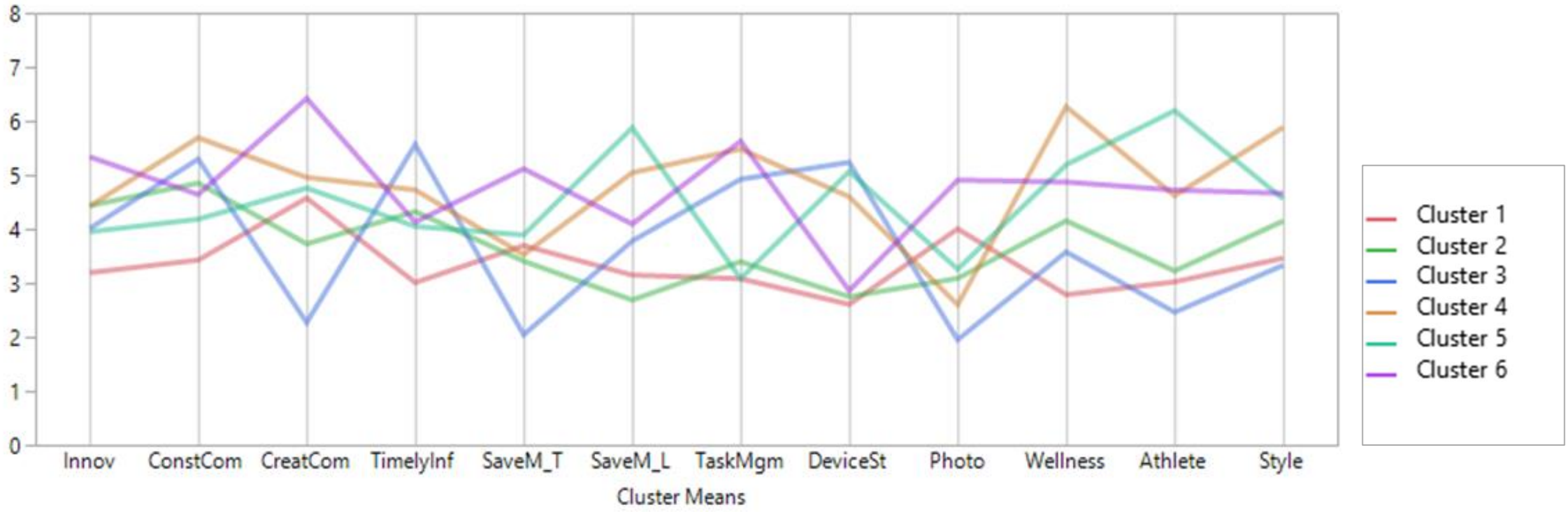
JMP Outputs



Cubic Clustering Criterion

	Number of Clusters	CCC
	1	0.000
->	2	6.205
	3	3.230
	4	1.905
	5	4.040
	6	6.115
	7	6.321
	8	7.880
	9	9.021
	10	9.724
	11	10.289
	12	10.150
	13	10.151
	14	9.918
	15	9.864
	16	9.898
	17	10.009
	18	10.114
	19	10.110
	20	10.198
	21	10.369
	22	10.588
	23	11.496
	24	11.578
	25	11.703
	26	11.803
	27	11.927
	28	12.036
	29	12.182
	30	12.339

JMP Outputs


8
7
6
5
4
3
2
1
0
Innov
ConstCom
CreatCom
TimelyInf
SaveM_T
SaveM_L
TaskMgm
DeviceSt
Photo
Wellness
Athlete
Style
Cluster Means
Cluster 1
Cluster 2
Cluster 3
Cluster 4
Cluster 5
Cluster 6

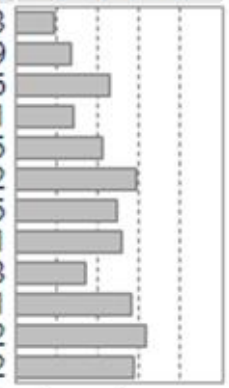
JMP Outputs

Cluster Means

Cluster	Count	Innov	ConstCom	CreatCom	TimelyInf	SaveM_T	SaveM_L	TaskMgm	DeviceSt	Photo	Wellness	Athlete	Style
1	223	3.19283	3.42601	4.57399	3.00897	3.69507	3.14798	3.08072	2.60538	4.00448	2.78475	3.02242	3.46188
2	182	4.43407	4.85165	3.72527	4.32418	3.40659	2.68681	3.39560	2.74725	3.08791	4.15385	3.22527	4.14835
3	182	4.01099	5.29670	2.26923	5.56593	2.04396	3.78022	4.92308	5.23626	1.95055	3.57692	2.46154	3.32967
4	207	4.42512	5.69082	4.95652	4.72464	3.52657	5.04348	5.48309	4.59903	2.59903	6.26570	4.61836	5.88406
5	120	3.95000	4.18333	4.75833	4.05000	3.89167	5.87500	3.08333	5.06667	3.25833	5.19167	6.19167	4.55833
6	86	5.33721	4.63953	6.41860	4.12791	5.11628	4.09302	5.62791	2.86047	4.90698	4.87209	4.72093	4.66279

Column Summary

Column	RSquare
Innov	0.1973
ConstCom	0.2709
CreatCom	0.4666
TimelyInf	0.2901
SaveM_T	0.4345
SaveM_L	0.5922
TaskMgm	0.5035
DeviceSt	0.5261
Photo	0.3503
Wellness	0.5751
Athlete	0.6462
Style	0.5792



Portion of total variation in each column absorbed by clustering

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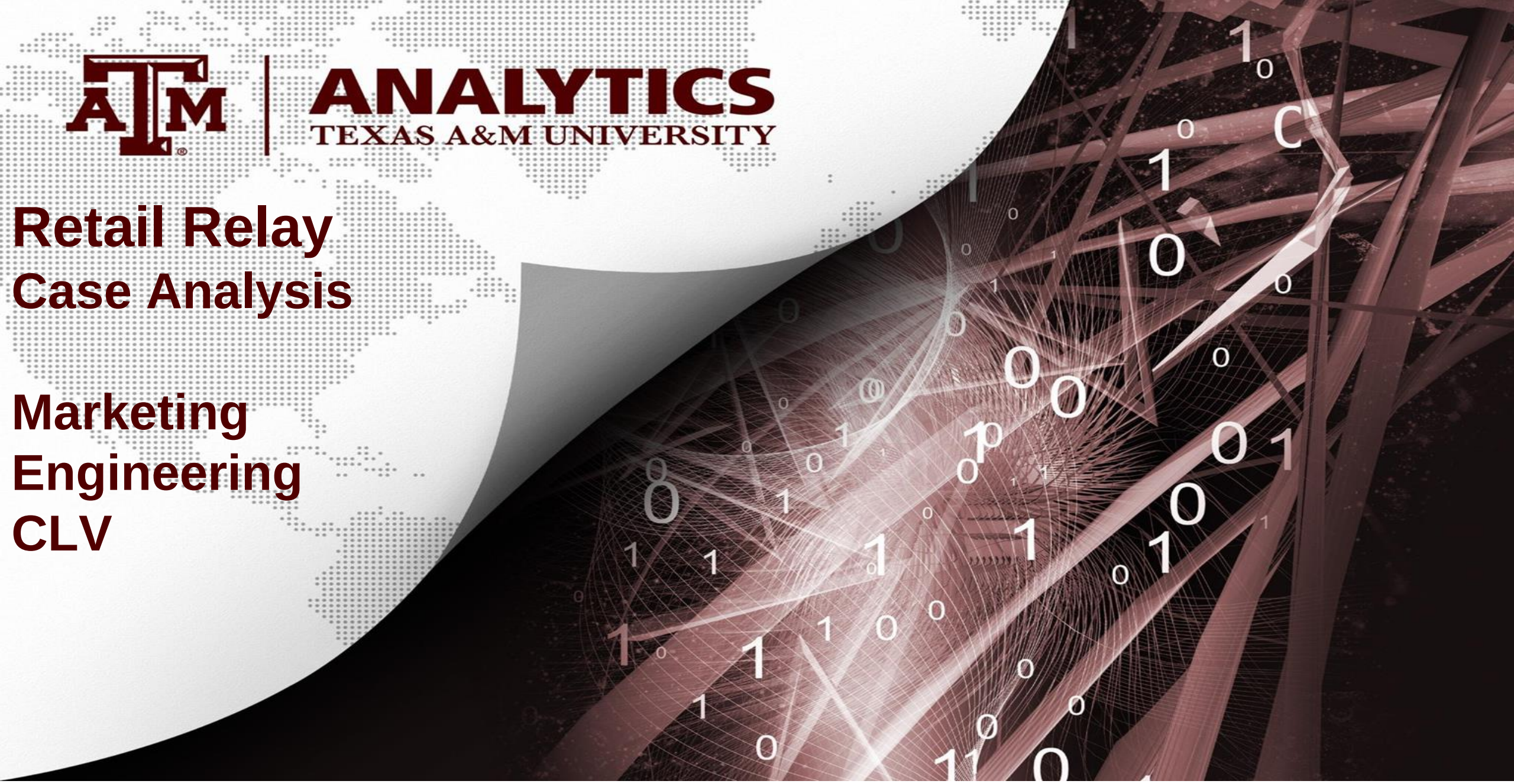
Retail Relay Case Analysis

Marketing Engineering CLV



Nathaniel Green's Contributions: Marketing Strategy, CLV Calculations and Packaging

Questions to be answered

Decision Analysis

CLV

Growth

What to do

1. **What is the expected customer lifetime value of a newly acquired customer? Use an annual discount rate of 10%.**

2. **Do you think the value is likely to increase or decrease as Retail Relay grows into a larger company?**

3. **Should Retail Relay move forward with the Richmond expansion?**

1. What is the expected customer lifetime value of a newly acquired customer? Use an annual discount rate of 10%.

Retail Relay's CLV was $33.63, using Annual discount rate of 10%, Marketing Expenses (allocated over the initial term's baskets), Distribution Expenses (allocated over all baskets)

I. Final CLV (See Exhibit 1 for Details)	$CLV = \sum_{t=1}^{30} \frac{r_t M_t}{(1+i)^{(t-1)}}$ = **$33.63**
II. Margin General	The general 15% margin was used in terms 1 & 4-30. In terms 2 - 3 the margins were 80% x 5% and 10% respectfully plus 20% x 15%. That amount was then multiplied by the stickiness factor (or the rate of retention) for a total general contribution (to be reduced by costs below).
III. (-) Marketing Expenditure Margin Detail	Ultimately, we deduced that marketing expenses were allocated to the pilot data through the reduction of the second and third period's general margins. No additional margin reductions were made for the marketing expenditures.
IV. (-) Variable Costs Margin Detail	Variable Costs were derived in two parts: 1) The sorter costs were factored by per unit variable cost, divided by the capacity revenue, reducing the margin per term of individual by 3.75%. 2) The factored shipping variable costs were a blended unit variable (truck $ / shipment and aggregate hours for delivery) divided by capacity of revenue per delivery truck, reducing the a margin per term of individual by 2.81%.

2. Do you think the value is likely to increase or decrease as Retail Relay grows into a larger company?

Under its current strategy, Retail Relay is likely to DECREASE in value as the company grows larger		
	Customer Acquisition Costs exceed Customer Lifetime Value	• Current promotions including ValPak and flyers cost $18.97 and $171.43 respectively to acquire a new customer (not including discounts) • Proposed electronic promotions are promising, but insufficient data is available to determine their effectiveness
	**Margins are likely to deteriorate as competition responds**	• Retail Relay is highly dependent upon local suppliers and cannot take advantage of economies of scale to compete with larger grocers (must find new suppliers in every market) • As larger grocers enter the market, they are likely be able to attract Retail Relay's suppliers with their purchasing power • Suppliers will gain additional power and will likely force Retail Relay to negotiate its 15% discount and decreasing CLV even further
	**To compensate for falling margins, Retail Relay would have to dramatically boost retention**	• With decreasing gross margins, Retail Relay would have to increase retention in order to increase or maintain its CLV • Current business strategy does not address retention, but is focused on expansion into new markets

See notes for calculations

3. Should Retail Relay move forward with the Richmond expansion?

Based on Retail Relay's current CLV data, customer attrition rate, marketing strategy, and supplier uncertainty, we believe the Retail Relay should NOT move forward with the Richmond expansion

I. CLV Data

- Current CLV (including variable costs) is $33.63 per customer
- No current data to demonstrate significant increase in average basket size, decrease in distribution costs, nor shorter iterations between basket purchases with expansion
- Anticipated growth of 25% monthly: 587 customers will grow to surpass 2,000 within 6 months and have a total CLV of $67,929

II. Customer Attrition Rate

- In the first three purchase events the customer has a low likelihood of retention (37% overall) and a low lifetime value due to the discounts undermining margins.
- Retail Relay should focus on improving attrition rates with fortified margins, not moving to Richmond.

III. Marketing Strategy

- Based on current data, word-of-mouth most effective marketing strategy in Charlottesville
- Charlottesville a much smaller geographic area, thus this marketing concept does not lend itself well to scaling initially
- Valpak mailers proved to be most cost effective strategy in Charlottesville (average cost of $1.87 per customer at t1), however at this time there is insufficient data/observations to predict forward effectiveness

IV. Supplier Uncertainty

- Increase in population size from 50,000 people in Charlottesville to 1,200,000 people in the Richmond Metro area
- Will be necessary to source new suppliers given the distance increase (~70 miles between Charlottesville and Richmond)
- Current discrepancy amongst Retail Relay's suppliers and their prices passed along to the consumer

Exhibit 1

CLV - Full Data

Purchase Occasion	Transition Probability	Average Basket Size	Probability of Retention to State t	CLV per Individual Per Term
1	NA	$49.51	1.00	4.18
2	68%	$62.28	0.68	0.52
3	80%	$57.01	0.54	1.36
4	77%	$62.03	0.42	2.16
5	91%	$63.06	0.38	1.99
6	90%	$72.90	0.35	2.07
7	82%	$60.30	0.28	1.40
8	91%	$63.68	0.26	1.34
9	95%	$72.04	0.25	1.44
10	95%	$67.89	0.23	1.28
11	89%	$70.07	0.21	1.17
12	100%	$82.48	0.21	1.37
13	94%	$82.17	0.20	1.28
14	94%	$61.12	0.19	0.89
15	93%	$65.79	0.17	0.89
16	93%	$82.29	0.16	1.03
17	100%	$65.32	0.16	0.81
18	100%	$99.20	0.16	1.22
19	100%	$73.74	0.16	0.90

Purchase Occasion	Transition Probability	Average Basket Size	Probability of Retention to State t	CLV per Individual Per Term
20	92%	$92.91	0.15	1.05
21	83%	$59.57	0.12	0.56
22	100%	$75.69	0.12	0.70
23	90%	$60.33	0.11	0.50
24	100%	$84.83	0.11	0.70
25	89%	$87.55	0.10	0.64
26	88%	$60.99	0.09	0.39
27	100%	$87.95	0.09	0.56
28	100%	$99.33	0.09	0.62
29	86%	$77.30	0.07	0.41
30	100%	$99.70	0.07	0.53

Sum of CLV = $33.96

$$CLV_{kt} = \sum_{t=1}^{Nk} \frac{r_{kt} M_{kt}}{(1+d)^{(t-1)}}$$

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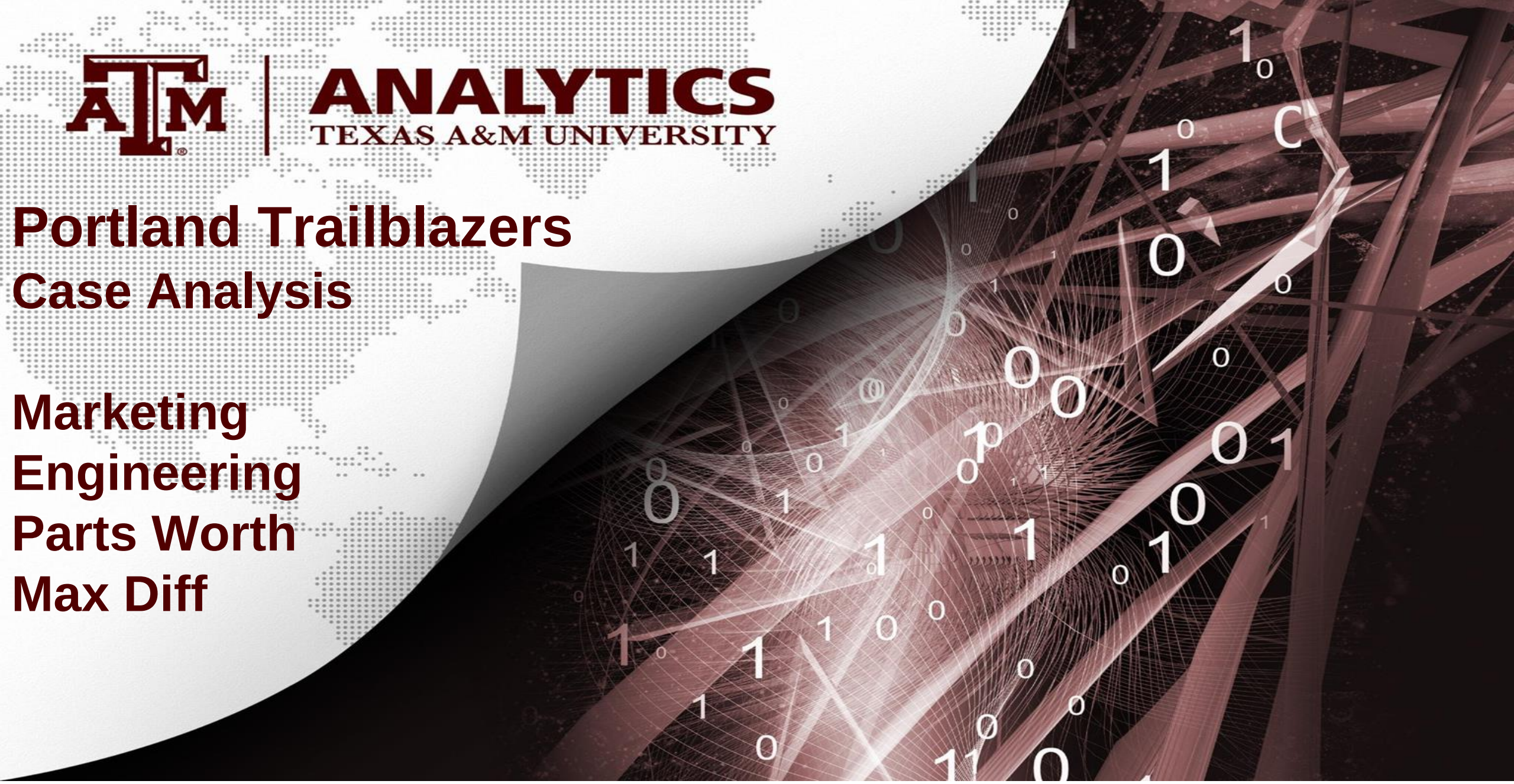
Portland Trailblazers
Case Analysis

Marketing Engineering
Parts Worth
Max Diff



Nathaniel Green's Contributions: Partsworth Calc's, Analysis, & Visual Summaries

Questions to be answered

1. Across each attribute, which is the most preferred level, and why?
2. Which attribute is the most important to the purchase decision?
3. Are each of the promotional items worth giving away for free?
4. What pricing and location decisions can you make from the conjoint?
5. Could you modify the size of the ticket packages in any way?

1. Across each attribute, which is the most preferred level, and why?

6 game package, $15 seat/game, 200 midcourt location, and hot dog/soda promotional items are the most preferred levels as they have the highest partworths

Attributes	Level 1	Level 2	Level 3	Level 4	Level 5	Utility Range
Number of Games	3 CYO: 1 elite, 2 VG	**6 CYO: 2 elite, 4 VG**	10 CYO: any combo			0.52023
Utility Score	0.03257	**0.24383**	-0.2764			
Partworth	$0.88	$6.61	-$7.50			
Ticket Price	**$15 seat/game**	$25 seat/game	$35 seat/game	$60 seat/game		1.65903
Utility Score	**0.65646**	0.22011	0.126	-1.00257		
Partworth	$17.81	$5.97	$3.42	-$27.19		
Ticket Location	300, behind baskets	300, corners	300, midcourt	**200 midcourt**		1.74317
Utility Score	-0.73169	-0.43716	0.15736	**1.01148**		
Partworth	-$19.85	-$11.86	$4.27	$27.44		
Promotional Item	Priority playoff	**Hot dog/soda**	Apparel	$20 restaurant GC	None	0.49214
Utility Score	0.12511	**0.17428**	0.00158	0.01689	-0.31786	
Partworth	$3.39	$4.73	$0.04	$0.46	-$8.62	

2. Which attribute is the most important to the purchase decision?

At 39.5%, Ticket Location is the most important attribute to the purchase decision

Attributes	Level 1	Level 2	Level 3	Level 4	Level 5	Utility Range
Number of Games	3 CYO: 1 elite, 2 VG	**6 CYO: 2 elite, 4 VG**	10 CYO: any combo			0.52023
Utility Score	0.03257	**0.24383**	-0.2764			
Partworth	$0.88	$6.61	-$7.50			
Ticket Price	**$15 seat/game**	$25 seat/game	$35 seat/game	$60 seat/game		1.65903
Utility Score	**0.65646**	0.22011	0.126	-1.00257		
Partworth	$17.81	$5.97	$3.42	-$27.19		
Ticket Location	300, behind baskets	300, corners	300, midcourt	**200 midcourt**		1.74317
Utility Score	-0.73169	-0.43716	0.15736	**1.01148**		
Partworth	-$19.85	-$11.86	$4.27	$27.44		
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Utility Score	0.12511	**0.17428**	0.00158	0.01689	-0.31786	
Partworth	$3.39	$4.73	$0.04	$0.46	-$8.62	

Ticket Price Range	$45.00	*(Max Ticket Price - Min Ticket Price)*
$ per utility unit	$27.12	*(Price Range)/(Utility Range for Ticket Price)*

Attribute Importance
Number of Games
11.8%
Ticket Price
37.6%
Ticket Location
39.5%
Promotional Item
11.1%

3. Are each of the promotional items worth giving away for free?

No, they are not as Apparel and Gift Certificate have low utility scores/value

The conjoint reveals that those surveyed do not value apparel nor restaurant gift certificates very highly and therefore any package offering only these would likely not capture the same level of interest as other promotional items. Only playoff priority consistently has no risk of loss after incorporating fixed costs; however, all other promo items can be given away as long as the ticket package ultimately selected by management does not include the 300-corner seat location for $15 per seat per game (as shown to the right, $15 ticket packages show location/price combinations' fixed costs exceed revenue*).

3 Games				
Seat Location	Playoff	Eats	Apparel	GC
300-basket	$ 15.00	$ 5.25	$ 3.00	$ 5.00
300-corner	$ 9.00	$ (0.75)	$ (3.00)	$ (1.00)
300-midcourt	$ 21.00	$ 11.25	$ 9.00	$ 11.00
200-midcourt	$ 60.00	$ 50.25	$ 48.00	$ 50.00

While Priority Playoff has no overhead associated and provides potential for playoff ticket sales, it is the second ranked attribute dollar value. Hot dog/soda has the highest attribute dollar value. The ultimate recommendation is to offer Priority Playoff as the promotional giveaway, but in conjunction with hot dog/soda. The customer's utility gain against the marginal cost of the hot dog and soda could help the Trail Blazers add immediate value to the package offering, while retaining the long-term partnership benefits of the playoff tickets promotional item.

6 Games				
Seat Location	Playoff	Eats	Apparel	GC
300-basket	$ 30.00	$ 10.50	$ 18.00	$ 20.00
300-corner	$ 18.00	$ (1.50)	$ 6.00	$ 8.00
300-midcourt	$ 42.00	$ 22.50	$ 30.00	$ 32.00
200-midcourt	$ 120.00	$ 100.50	$ 108.00	$ 110.00

10 Games				
Seat Location	Playoff	Eats	Apparel	GC
300-basket	$ 50.00	$ 17.50	$ 38.00	$ 40.00
300-corner	$ 30.00	$ (2.50)	$ 18.00	$ 20.00
300-midcourt	$ 70.00	$ 37.50	$ 58.00	$ 60.00
200-midcourt	$ 200.00	$ 167.50	$ 188.00	$ 190.00

Attribute $ Value *($ per utility unit * partworth)*					
Attribute	Level 1	Level 2	Level 3	Level 4	Level 5
Number of Games	$0.88	$6.61	-$7.50		
Ticket Price	$17.81	$5.97	$3.42	-$27.19	
Ticket Location	-$19.85	-$11.86	$4.27	$27.44	
Promotional Item	$3.39	$4.73	$0.04	$0.46	-$8.62

Fixed Costs					
Location	300, behind baskets	300, corners	300, midcourt	200 midcourt	
	$10.00	$12.00	$18.00	$40.00	
Promotional Item	Priority playoff	Hot dog/soda	Apparel	$20 restaurant GC	None
	$0.00	$3.25	$12.00	$10.00	$0.00

* revenue is assumed independent of customer utility value.

4. What pricing and location decisions can you make from the conjoint?

The package with the highest attribute dollar value would be the 6 game package in the 200 midcourt level with a free hot dog/soda for $15 per seat per game

HOWEVER…

While the partworths identify section 200-midcourt and $15 per game per ticket as the highest valued, based on location and pricing **rules stipulated by management, the optimal location and pricing would be 300-midcourt at $25 per ticket**.

Playoff Priority as the promotional item maximizes revenue potential as it is the second highest valued item in that attribute, it has $0 associated overhead, and it creates the opportunities for future ticket sales during playoffs.

Attribute $ Value *($ per utility unit * partworth)*					
Attribute	**Level 1**	**Level 2**	**Level 3**	**Level 4**	**Level 5**
Number of Games	$0.88	$6.61	-$7.50		
Ticket Price	$17.81	$5.97	$3.42	-$27.19	
Ticket Location	-$19.85	-$11.86	$4.27	$27.44	
Promotional Item	$3.39	$4.73	$0.04	$0.46	-$8.62

The attribute dollar value of this package is $20.24
The revenue potential is $42.00 per package

5. Could you modify the size of the ticket packages in any way?

The Trail Blazers Could modify the size of the ticket packages.

While the optimal ticket package selected offers $25 per seat per game with priority consideration for home playoff tickets, the package could be adjusted to the $35 per seat per game price level with both the priority for home playoff tickets and include the hot dog and soda with each ticket.

Additionally, the Ticket price could be adjusted up to $35 per seat per game giving the package a net positive utility factor over the preferred package.

Ticket packages could also be made more customizable where fans could select their promotional item with Playoff Priority included regardless, or more than one option of location and price for those who might be interested in purchasing 200-midcourt for $60 per seat per game.

PORTLAND
TRAIL BLAZERS

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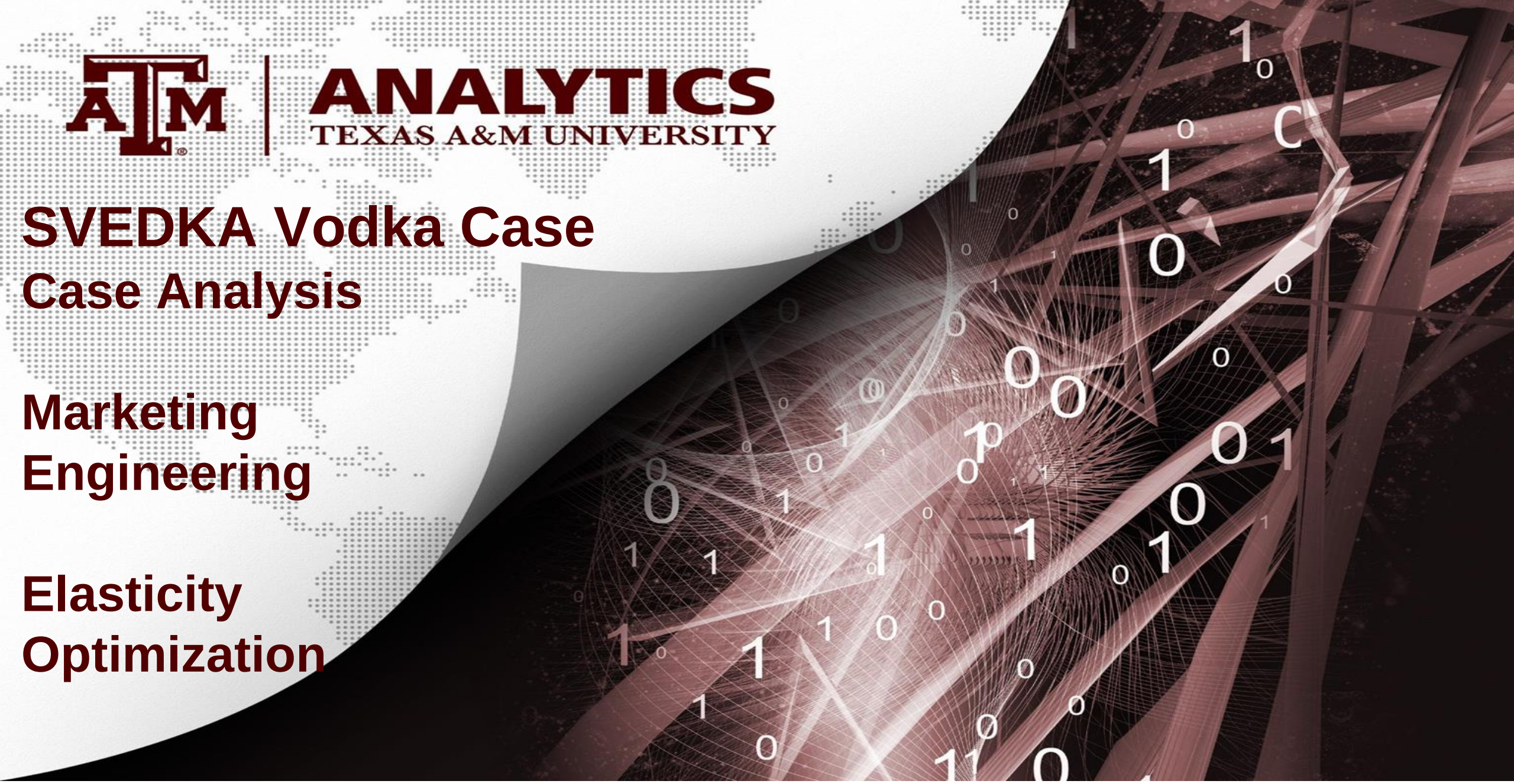
SVEDKA Vodka Case

Case Analysis

Marketing Engineering

Elasticity Optimization



Nathaniel Green's Contributions: Elasticity Calc's & Analysis

1. Run a regression of natural log of change in sales on (LnDiff in the dictionary) natural log of previous period prices (LnLPrice), print (LnPrint), outdoor (LnOut) and broadcasting (LnBroad) advertising.

Summary of Fit

RSquare	0.100489
RSquare Adj	0.085804
Root Mean Square Error	0.167419
Mean of Response	0.056065
Observations (or Sum Wgts)	250

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	4	0.7671679	0.191792	6.8426
Error	245	6.8671449	0.028029	Prob > F
C. Total	249	7.6343128		<.0001*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
Intercept	0.0236749	0.068308	0.35	0.7292	-0.110871	0.1582209
LnLPrice	-0.001598	0.017507	-0.09	0.9274	-0.036081	0.0328856
LnOut	-0.011209	0.005899	-1.90	0.0586	-0.022828	0.0004106
LnBroad	-0.003839	0.00526	-0.73	0.4661	-0.014199	0.0065204
LnPrint	0.0175222	0.004179	4.19	<.0001*	0.0092911	0.0257532

Estimation Results indicate significant effects of **Print**.

In our results, short-term elasticities are interpretable:

Term	Short-Term Elasticity
LnLPrice per 1% increase	N/A
LnPrint per 1% increase	0.018% increase in Sales
LnOut per 1% increase	N/A
LnBroad per 1% increase	N/A

2. Add product Tier-1 and Tier-2 dummies, to the above set to understand the how including these variables change elasticities.

Summary of Fit

RSquare	0.132899
RSquare Adj	0.111489
Root Mean Square Error	0.16505
Mean of Response	0.056065
Observations (or Sum Wgts)	250

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	6	1.0145925	0.169099	6.2074
Error	243	6.6197202	0.027242	Prob > F
C. Total	249	7.6343128		<.0001*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
Intercept	0.1429824	0.082782	1.73	0.0854	-0.02008	0.3060446
LnLPrice	-0.037669	0.022229	-1.69	0.0914	-0.081455	0.0061174
LnOut	-0.012798	0.006078	-2.11	0.0363*	-0.024769	-0.000826
LnBroad	-0.004939	0.00535	-0.92	0.3568	-0.015477	0.0055982
LnPrint	0.0093039	0.00507	1.84	0.0677	-0.000682	0.0192897
Tier1	0.1450454	0.057519	2.52	0.0123*	0.0317458	0.258345
Tier2	0.1304536	0.043547	3.00	0.0030*	0.0446765	0.2162308

Estimation Results indicate significant effects of **Outdoor**, **Tier 1** and **Tier 2 brands**.

In our results, short-term elasticities are interpretable:

Term	Short-Term Elasticity
LnLPrice per 1% increase	N/A
LnPrint per 1% increase	N/A
LnOut per 1% increase	0.013% decrease in Sales
LnBroad per 1% increase	N/A
Tier1 per unit increase	0.145% increase in Sales
Tier2 per unit increase	0.130% increase in Sales

3. Add logtotalminussales to understand how including the effect of competition changes elasticity estimates.

Summary of Fit

RSquare	0.177192
RSquare Adj	0.153392
Root Mean Square Error	0.161111
Mean of Response	0.056065
Observations (or Sum Wgts)	250

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	7	1.3527397	0.193249	7.4450
Error	242	6.2815731	0.025957	Prob > F
C. Total	249	7.6343128		<.0001*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
Intercept	-1.787642	0.540968	-3.30	0.0011*	-2.853249	-0.722036
LnLPrice	-0.057191	0.022362	-2.56	0.0112*	-0.101241	-0.013141
LnOut	-0.00599	0.006225	-0.96	0.3369	-0.018253	0.0062723
LnBroad	0.0035601	0.005728	0.62	0.5349	-0.007724	0.014844
LnPrint	0.0114994	0.004986	2.31	0.0219*	0.0016784	0.0213204
Tier1	0.1292767	0.056316	2.30	0.0226*	0.0183444	0.240209
Tier2	0.1210729	0.042587	2.84	0.0049*	0.0371847	0.2049611
LagTotalMinusSales	3.1827e-5	8.818e-6	3.61	0.0004*	1.4457e-5	0.0000492

Estimation Results indicate significant effects of **Change of Sales**, **Price**, **Print**, **Tier 1 brands**, **Tier 2 brands** and **LagTotalMinusSales**.

In our results, short-term elasticities are interpretable:

Term	Short-Term Elasticity	Long-Term Elasticity
LnLPrice per 1% increase	N/A	0.057% decrease in Sales
LnPrint per 1% increase	N/A	0.011% increase in Sales
LnOut per 1% increase	0.013% decrease in Sales	N/A
LnBroad per 1% increase	N/A	N/A
Tier1 per unit increase	0.145% increase in Sales	0.129% increase in Sales
Tier2 per unit increase	0.130% increase in Sales	0.121% increase in Sales

The long-term elasticity is virtually indifferent from short-term elasticity. That is to say, because the lagged demand in the long-term elasticity (short-term elasticity/ (1-lagged DV coefficient) has such minimal effect, both elasticities are the same.

4. Add firstintro to understand how controlling for new product introduction changes price elasticities.

Summary of Fit

RSquare	0.314348
RSquare Adj	0.291588
Root Mean Square Error	0.147377
Mean of Response	0.056065
Observations (or Sum Wgts)	250

Analysis of Variance

Source	DF	Sum of Squares	Mean Square	F Ratio
Model	8	2.3998295	0.299979	13.8113
Error	241	5.2344833	0.021720	Prob > F
C. Total	249	7.6343128		<.0001*

Parameter Estimates

Term	Estimate	Std Error	t Ratio	Prob>|t|	Lower 95%	Upper 95%
Intercept	-1.624272	0.495409	-3.28	0.0012*	-2.600156	-0.648388
LnLPrice	-0.086451	0.020886	-4.14	<.0001*	-0.127592	-0.045309
LnOut	-0.007868	0.005701	-1.38	0.1688	-0.019098	0.0033622
LnBroad	0.0075903	0.005272	1.44	0.1512	-0.002795	0.0179756
LnPrint	0.0128936	0.004565	2.82	0.0051*	0.003901	0.0218863
Tier1	0.1273213	0.051516	2.47	0.0141*	0.0258425	0.2288001
Tier2	0.1287276	0.038972	3.30	0.0011*	0.0519587	0.2054966
LagTotalMinusSales	3.0934e-5	8.067e-6	3.83	0.0002*	1.5043e-5	4.6826e-5
Firstintro	0.5427031	0.078163	6.94	<.0001*	0.3887341	0.6966721

Estimation Results indicate significant effects of **Change of Sales**, **Price**, **Print**, **Tier 1 brands**, **Tier 2 brands**, **LagTotalMinusSales** and **FirstIntro**.

In our results, short-term elasticities are interpretable:

Term	Short-Term Elasticity	Long-Term Elasticity
LnLPrice per 1% increase	0.086% decrease in Sales	0.086% decrease in Sales
LnPrint per 1% increase	0.013% increase in Sales	0.013% increase in Sales
LnOut per 1% increase	N/A	N/A
LnBroad per 1% increase	N/A	N/A
Tier1 per 1% increase	0.127% increase in Sales	0.129% increase in Sales
Tier2 per 1% increase	0.129% increase in Sales	0.129% increase in Sales

We note that First Intro, has a relatively significant effect on sales. Elasticity for a new brand is worth noting for efforts involving this control variable.

5. Overall, what do you learn about how price and advertising elasticity change as you include variables?

Advertising slightly affects Change of Sales and Price, as we include more variables into the Estimation analysis.

In the first two analyses where we only included Print advertising and the two dummy variables for Brands the Change of Sales is positive, but in the analyses where we included the Previous year total industry quantity of cases sold minus own brand sales and the variable for the first three years of brand's introduction, seems to have negative impact on Changes of Sales.

Term	Estimate Q1	Estimate Q2	Estimate Q3	Estimate Q4
Intercept	0.0236749	0.1429824	**-1.787642**	**-1.624272**
LnLPrice	-0.001598	-0.037669	**-0.057191**	**-0.086451**
LnOut	-0.011209	**-0.012798**	-0.00599	-0.007868
LnBroad	-0.003839	-0.004939	0.0035601	0.0075903
LnPrint	**0.0175222**	0.0093039	**0.0114994**	**0.0128936**
Tier1		**0.1450454**	**0.1292767**	**0.1273213**
Tier2		**0.1304536**	**0.1210729**	**0.1287276**
LagTotalMinusSales			**0.000031827**	**0.000030934**
Firstintro				**0.5427031**

Statistically Significant Coefficients

6. Recommend the optimal price to overall advertising ratio.

X/PQ = - (EX/EP)

Print = -(0.0129/-0.086) = 0.15
Which means we should spend 15% of our revenue from price on print advertising.