BUDT758L: Price Optimization and Revenue Management

Final Project Report

Question 1

	a	b								
Logit model	-4.240922507	0.03309584454								
W(p)	1-W(p)	Likelihood	LN (likelihood)		Maximum log likelihood					
0.6967883267	0.3032116733	0.3032116733	-1.193324125		-4013.613846					
0.7037347546	0.2962652454	0.7037347546	-0.3513537629							
0.395179513	0.604820487	0.604820487	-0.5028235806							
0.1046516645	0.8953483355	0.8953483355	-0.1105424348							
0.395179513	0.604820487	0.395179513	-0.9284151541							
0.395179513	0.604820487	0.604820487	-0.5028235806							
0.0874520046	0.9125479953	0.9125479953	-0.09151459728							
0.5011635993	0.4988364007	0.5011635993	-0.6908226857					INPUTS		
0.1143267052	0.8856732948	0.8856732948	-0.1214071381							
0.459880232	0.540119768	0.540119768	-0.6159643714					Logit curve		
0.2778552947	0.7221447053	0.7221447053	-0.3255297373		no of rows			a	-4.240922507	
0.2165164514	0.7834835486	0.2165164514	-1.530088746		7155			b	0.03309584454	
0.6826243955	0.3173756045	0.6826243955	-0.3818105041							
0.4111048448	0.5888951552	0.4111048448	-0.8889070003					cost		
0.1284308503	0.8715691497	0.1284308503	-2.052364649							
0.1847247964	0.8152752036	0.8152752036	-0.2042295496					price	**$101.9962**	
0.239813884	0.760186116	0.760186116	-0.2741919863					W(p)	0.7038	
0.451671191	0.548328809	0.548328809	-0.6008801556							
0.6607349905	0.3392650095	0.3392650095	-1.080973738					Expected contribution		71.78094513
0.4434883662	0.5565116338	0.5565116338	-0.5860672032							

a. The **single price per person** that maximizes expected revenue per event would be **$101.99** or approximately $102. The **expected revenue** per transaction for that price would be:
   p * W(p) * 50 = $101.99 * 0.7038*50
   = **$3589.05**.

b. Assuming the annual number of inquiries stays the same, using the price we determined, the **total expected revenue** for the company would be:
   expected revenue * number of inquiries = $3589.05 ***** 7155
   = **$25,679,633**.
   This revenue, compared to the 2007 total revenue, shows a **$8.75 million increase** from the original $16,927,650 total revenue of 2007.

Question 2

We found that the Win field is negatively correlated with Quote and with Booking Date being a close second.

	Location	*Type*	*Booking date (# of days before the event)*	*Quote*	*Win*
Location	1				
Type	0.00226208	1			
Booking date (# of days before the event)	-0.0022708	-0.0059037	1		
Quote	-0.0229808	0.00823585	-0.0152517	1	
Win	0.01490607	-0.0281629	-0.2251521	-0.407172	1

a. The segmentation criterion is Booking Date (which represents how many days in advance the booking was made), segmenting by days in the following manner:
   Bin 1: 0 - 80 days
   Bin 2: 80 - 140 days
   Bin 3: More than 140 days

b. For each segment the Revenue Maximizing Price & Expected Revenue for each Transaction is:
   i. Segment 1:
      1. Price: $117.77
      2. Expected Contribution per person = Price * W(p)
         = $117.77 * 0.7858
         = $92.54
      3. Revenue per transaction = Expected Contribution per person * 50
         = $4627.39

	a	b	
Logit model	-5.969024541	0.04	
Maximum log likelihood	-1335.224347		
price	$117.7716		
W(p)	0.7858	=1/(1+EXP(O3+P3*O7))	
Expected contribution	92.54786273	=O7*O8	
Total Revenue	4627.393137	=O10*50	

   ii. Segment 2:
      1. Price: $96.39
      2. Expected Contribution per person = Price * W(p)
         = $96.39 * 0.6909
         = $66.59
      3. Revenue per transaction = Expected Contribution per person * 50
         = $3329.82

	a	b	
Logit model	-4.039079871	0.034	
Maximum log likelihood	-1251.144799		
optimal price	$96.3949		
W(p)	0.6909	=1/(1+EXP(O3+P3*O7))	
Expected contribution	66.59640948	=O7*O8	
Total Revenue	3329.820474	=O10*50	

   iii. Segment 3:
      1. Price: $90.87

2. Expected Contribution per person = Price * W(p)
   = $90.87 * 0.6678
   = $60.68
3. Revenue per transaction = Expected Contribution per person * 50
   = $3034.09

Logit model	-3.708123996	0.033	
Maximum log likelihood	-1213.761208		
price	$90.8719		
W(p)	0.6678	=1/(1+EXP(O3+P3*O7))	
Expected contribution	60.68183772	=O7*O8	
Total Revenue	3034.091886	=O10*50	

c. The annual expected revenue for each segment is:
   i. Segment 1:
   Revenue per transaction * number of transactions
   = 4627.39 * 2358
   = $10,911,393.02

   ii. Segment 2:
   Revenue per transaction * number of transactions
   = $3329.82 * 2367
   = $7,881,685.06

   iii. Segment 3:
   Revenue per transaction * number of transactions
   = $3034.09 * 2430
   = $7,372,843.28

The total expected revenue is revenue from segment 1 + revenue from segment 2 + revenue from segment 3 = $26,165,921. Compared to the 2007 revenue ($16,927,650) we see an increase of $9.23 million dollars.

Results			
	2007 data	Single Price Model	Segmented Model
Optimal Price(s)	N/A	$101	P1: $117.77 P2: $96.39 P3: $90.87
Total Revenue per year	$16,927,650	$25,679,633	$26,165,921

Question 3

The project's segmentation criteria is established based on booking dates, divided into intervals like 21-80 days, 80-140 days, and over 140 days. This approach is designed to analyze customer behavior in relation to the time before the booking date, and it does not directly factor in the costs of each contract.

The fact that each contract might have different costs is not directly relevant to the segmentation criteria. The focus is on the temporal patterns of bookings, which are independent of the individual contract costs. Hence, variations in contract costs would not necessitate a change in the segmentation approach.

Although the varying costs of contracts do not affect the segmentation, they are crucial for the overall revenue analysis. Different costs imply different profit margins for each contract, impacting the total revenue and potentially influencing the pricing strategy.

Question 4

Similar to the case with varying contract costs, since the analysis in question 2 is based solely on the number of booking days without considering group size, the methodology of this analysis remains unaffected. The segmentation based on booking days remains relevant, and the insights derived would still be valid for understanding customer booking behavior over time.

In Question 1, to maximize event revenue, the group size would become a critical factor and would change the analysis. The total revenue from an event is a product of the price per person and the number of attendees. Thus, variations in group size would directly affect the revenue potential. We recognize that different group sizes may have varying responses to price changes. Larger groups might be more price-sensitive due to higher overall event costs. This variation can influence the optimal price point for maximizing revenue. In finding the optimal price per person, we would change the analysis to balance the per-person rate with the likelihood of the price being accepted by groups of varying sizes.