The SAS System

Obs	X1	X5	X19	X20	X21
1	2	1	8.2	8.0	8.4
2	3	0	5.7	6.5	7.5
3	3	1	8.9	8.4	9.0
4	1	0	4.8	6.0	7.2
5	2	1	7.1	6.6	9.0
6	1	0	4.7	6.3	6.1
7	1	0	5.7	7.8	7.2
8	2	0	6.3	5.8	7.7
9	2	0	7.0	7.5	8.2
10	1	0	5.5	5.9	6.7
11	3	1	7.4	7.0	8.4
12	1	0	6.0	6.3	6.6
13	1	1	8.4	8.4	7.9
14	3	1	7.6	6.9	8.2
15	2	1	8.0	7.0	7.6
16	3	0	6.6	6.4	7.1
17	2	1	6.4	7.5	7.2
18	2	0	7.4	6.9	8.2
19	2	0	6.8	7.5	7.9
20	3	0	7.6	8.5	8.8
21	1	0	5.4	5.5	7.0
22	3	1	9.9	9.6	9.9
23	2	1	7.0	7.1	8.1
24	3	1	8.6	8.1	8.0
25	1	0	4.8	4.9	5.5
26	2	0	6.6	6.8	7.0
27	3	0	6.3	7.1	7.0
28	1	0	5.4	5.5	5.6
29	3	0	6.3	6.9	7.2
30	1	0	5.4	5.5	6.2
31	1	1	6.1	6.8	7.1
32	1	0	6.4	5.8	6.2
33	1	0	5.4	6.5	7.6
34	2	0	7.3	7.5	9.0
35	1	0	6.3	6.6	6.7
36	1	0	5.4	4.6	7.1
37	2	1	7.1	8.0	7.2
38	3	1	8.7	9.9	9.9
39	2	0	7.6	6.9	7.6
40	1	0	6.0	5.5	5.8
41	2	0	7.0	7.5	8.4

42	2	1	7.6	8.0	7.9
43	3	1	8.9	7.8	7.6
44	2	1	7.6	7.9	8.4
45	3	0	5.5	5.6	6.5
46	2	0	7.4	8.6	7.7
47	3	1	7.1	8.8	8.0
48	2	0	7.6	7.6	7.1
49	3	1	8.7	8.1	8.5
50	3	1	8.6	7.8	7.6
51	1	0	5.4	7.5	7.2
52	3	0	5.7	7.1	8.2
53	3	1	8.7	9.0	9.0
54	1	1	6.1	7.0	7.2
55	2	0	7.3	8.1	8.1
56	3	0	7.7	7.6	8.9
57	2	1	9.0	7.9	8.8
58	3	0	8.2	7.5	7.5
59	3	0	7.1	6.5	7.0
60	3	0	7.9	8.5	8.5
61	3	0	6.6	6.9	7.2
62	2	1	8.0	7.6	8.8
63	1	1	6.3	5.5	8.0
64	1	0	6.0	6.0	8.1
65	1	0	5.4	6.9	7.1
66	2	0	7.6	6.9	9.0
67	2	0	6.4	5.6	6.2
68	2	1	6.1	6.3	8.2
69	1	0	5.2	5.8	5.8
70	2	0	6.6	6.6	8.0
71	3	0	7.6	7.5	7.7
72	1	1	5.8	6.0	7.0
73	2	0	7.9	6.6	7.9
74	3	1	8.6	8.8	9.8
75	2	1	8.2	7.0	8.4
76	3	0	7.1	6.6	8.9
77	1	1	6.4	6.9	7.5
78	2	1	7.6	7.3	8.0
79	3	1	8.9	7.3	8.1
80	1	0	5.7	5.8	7.6
81	3	0	7.1	7.9	8.8
82	3	0	7.4	7.3	8.0
83	2	1	6.6	6.1	8.5
84	1	0	5.0	5.1	6.5
85	2	1	8.2	7.5	7.7

86	1	0	5.2	6.0	7.2
87	1	0	5.2	5.5	6.0
88	2	1	8.2	7.6	8.2
89	2	1	7.3	6.5	7.4
90	2	1	8.2	7.6	9.3
91	3	0	7.4	7.9	7.9
92	1	0	4.8	5.0	6.5
93	3	1	7.6	7.5	8.6
94	3	1	8.9	7.6	8.9
95	3	0	7.7	7.3	8.4
96	1	1	7.3	8.1	8.1
97	1	1	6.3	5.5	7.2
98	1	1	5.4	7.0	7.7
99	2	1	6.4	7.1	7.4
100	2	0	6.4	7.3	7.0
101	1	0	5.4	5.5	6.1
102	3	1	8.7	9.1	7.1
103	2	1	6.1	7.0	7.6
104	1	1	8.4	9.4	9.0
105	2	0	7.9	8.4	8.9
106	2	0	7.0	7.0	7.5
107	3	1	8.7	7.6	9.3
108	2	0	7.9	7.9	8.0
109	2	1	7.1	7.3	7.6
110	1	0	5.8	5.3	7.1
111	3	1	8.4	7.1	8.1
112	3	1	7.1	6.3	7.9
113	2	0	7.6	8.3	7.2
114	3	1	7.3	7.0	7.7
115	2	1	8.0	8.8	7.9
116	2	1	6.1	6.9	6.9
117	3	1	8.7	8.0	9.5
118	1	0	5.8	6.4	7.5
119	1	1	6.4	8.5	8.0
120	1	0	6.4	5.9	7.1
121	2	1	9.0	7.5	8.8
122	2	0	6.4	6.5	8.0
123	1	0	6.0	6.4	7.7
124	3	1	8.7	7.9	8.2
125	1	0	5.0	6.1	6.5
126	2	1	7.4	8.0	8.1
127	3	0	8.6	6.5	8.1
128	1	0	5.8	6.0	6.9
129	3	1	9.8	8.1	9.3

130	1	0	4.8	5.0	6.2
131	2	1	7.0	6.9	8.0
132	3	0	5.5	5.6	7.1
133	1	0	5.0	5.1	6.5
134	1	0	6.0	6.9	7.1
135	2	1	8.0	7.5	8.2
136	3	1	7.9	7.1	7.0
137	1	0	4.8	5.8	6.7
138	2	1	6.4	6.6	7.5
139	1	0	4.8	6.1	7.4
140	1	1	6.4	6.8	7.4
141	2	0	6.8	6.5	7.9
142	3	0	7.9	8.3	8.0
143	3	1	8.9	9.4	8.0
144	3	0	7.4	6.6	8.4
145	3	0	7.0	7.6	8.8
146	3	1	7.0	7.8	7.9
147	1	0	6.0	6.0	6.0
148	3	0	7.4	6.0	8.2
149	2	1	7.6	9.1	8.4
150	1	0	4.8	5.0	7.4
151	3	0	7.3	5.8	8.0
152	2	0	6.3	5.9	6.6
153	1	0	5.0	5.3	7.6
154	3	1	7.1	6.8	7.5
155	1	0	6.3	6.1	7.1
156	3	0	6.8	5.9	7.9
157	1	0	5.2	5.3	7.6
158	1	1	6.3	5.6	7.1
159	2	1	6.1	6.1	7.6
160	2	1	7.3	7.4	8.2
161	1	0	5.4	5.3	6.9
162	2	1	8.0	7.0	8.1
163	2	1	7.4	7.0	7.6
164	2	1	7.3	7.1	8.4
165	2	1	7.3	6.8	7.4
166	1	1	6.4	5.9	7.9
167	1	0	5.7	6.1	7.2
168	1	0	5.7	6.6	7.6
169	2	1	6.6	6.5	6.7
170	1	0	6.3	7.1	7.4
171	1	0	5.4	7.0	6.2
172	3	0	7.4	7.0	7.5
173	3	1	8.6	7.3	7.4

174	1	1	7.3	6.4	7.9
175	1	0	6.3	5.8	6.5
176	3	1	8.7	8.5	8.6
177	3	1	8.6	8.0	8.6
178	3	1	8.4	7.8	8.0
179	3	0	7.4	6.0	8.1
180	3	1	9.9	8.1	8.2
181	2	1	8.0	7.1	7.2
182	3	0	7.9	8.1	8.4
183	3	1	9.8	9.0	9.4
184	3	1	8.9	8.0	9.4
185	3	0	6.8	6.3	7.5
186	3	1	7.4	6.9	6.6
187	1	0	4.7	4.0	4.3
188	1	0	5.4	7.4	6.6
189	2	0	7.0	6.6	7.4
190	2	1	7.1	6.5	7.1
191	1	1	6.3	7.9	6.7
192	1	0	5.5	5.6	6.7
193	1	0	5.4	4.5	7.2
194	1	0	5.4	6.5	7.1
195	1	0	4.8	5.5	6.0
196	3	0	8.2	6.9	8.4
197	2	0	7.9	7.8	8.6
198	3	1	8.6	8.8	7.9
199	2	1	8.2	7.1	7.6
200	3	1	8.6	8.1	8.5

The SAS System

The GLM Procedure

Class Level Information		
Class	Levels	Values
X1	3	1 2 3
X5	2	0 1

Number of Observations Read	200
Number of Observations Used	200

The SAS System

The GLM Procedure

Dependent Variable: X19 X19 - Satisfaction

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

Model	5	210.9985960	42.1997192	85.69	<.0001
Error	194	95.5406040	0.4924773		
Corrected Total	199	306.5392000			

R-Square	Coeff Var	Root MSE	X19 Mean
0.688325	10.09447	0.701767	6.952000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
X1	2	164.3111118	82.1555559	166.82	<.0001
X5	1	37.2039765	37.2039765	75.54	<.0001
X1*X5	2	9.4835077	4.7417538	9.63	0.0001

Source	DF	Type III SS	Mean Square	F Value	Pr > F
X1	2	89.99547821	44.99773911	91.37	<.0001
X5	1	36.54361673	36.54361673	74.20	<.0001
X1*X5	2	9.48350768	4.74175384	9.63	0.0001

Interaction Plot for X19
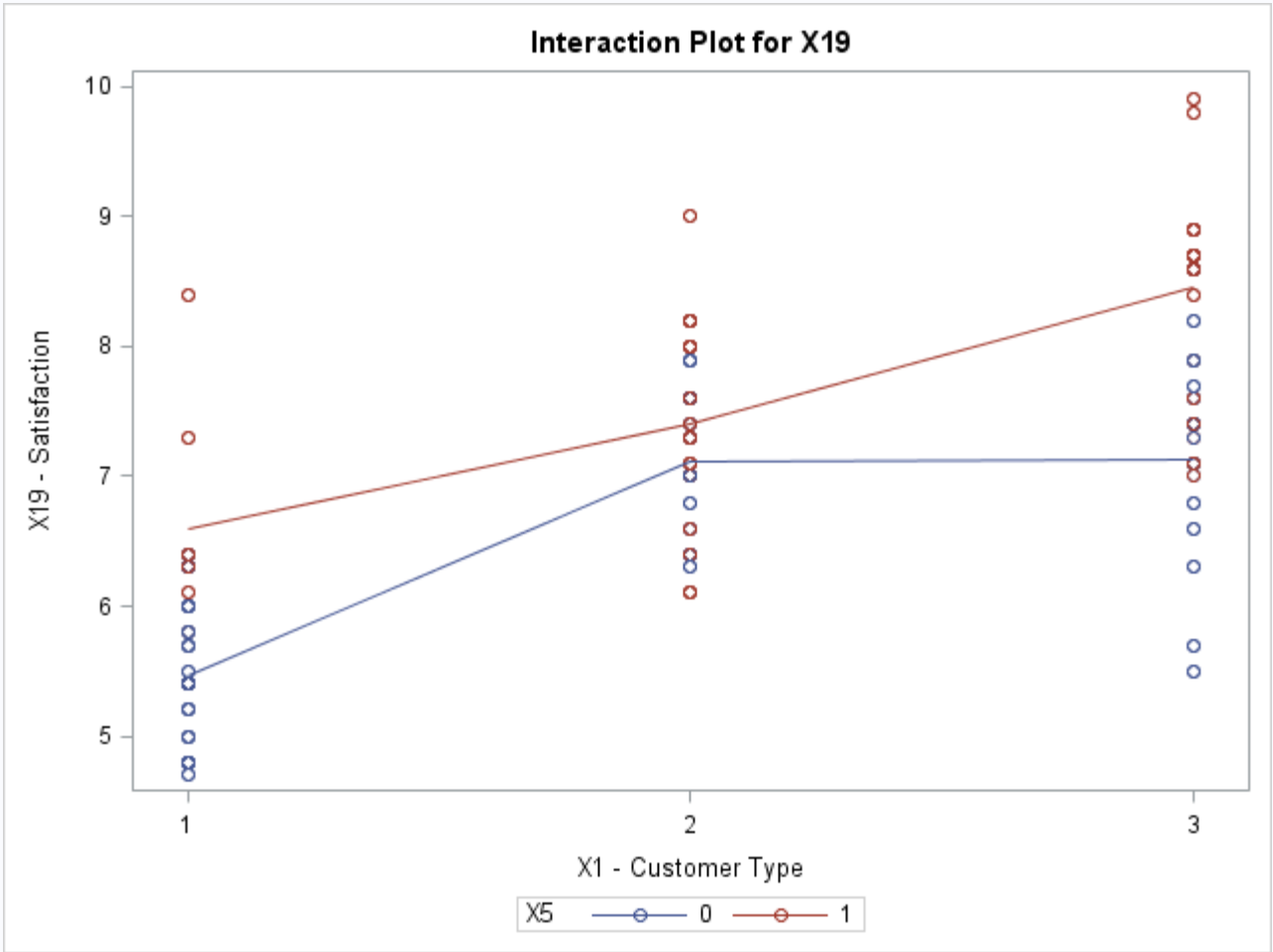
The SAS System

The GLM Procedure

Dependent Variable: X20 X20 - Likely to Recommend

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F

Model	5	103.0848044	20.6169609	30.70	<.0001
Error	194	130.2739456	0.6715152		
Corrected Total	199	233.3587500			

R-Square	Coeff Var	Root MSE	X20 Mean
0.441744	11.78656	0.819460	6.952500

Source	DF	Type I SS	Mean Square	F Value	Pr > F
X1	2	71.04275735	35.52137868	52.90	<.0001
X5	1	23.18145558	23.18145558	34.52	<.0001
X1*X5	2	8.86059150	4.43029575	6.60	0.0017

Source	DF	Type III SS	Mean Square	F Value	Pr > F
X1	2	32.03453561	16.01726781	23.85	<.0001
X5	1	23.69222765	23.69222765	35.28	<.0001
X1*X5	2	8.86059150	4.43029575	6.60	0.0017

Interaction Plot for X20
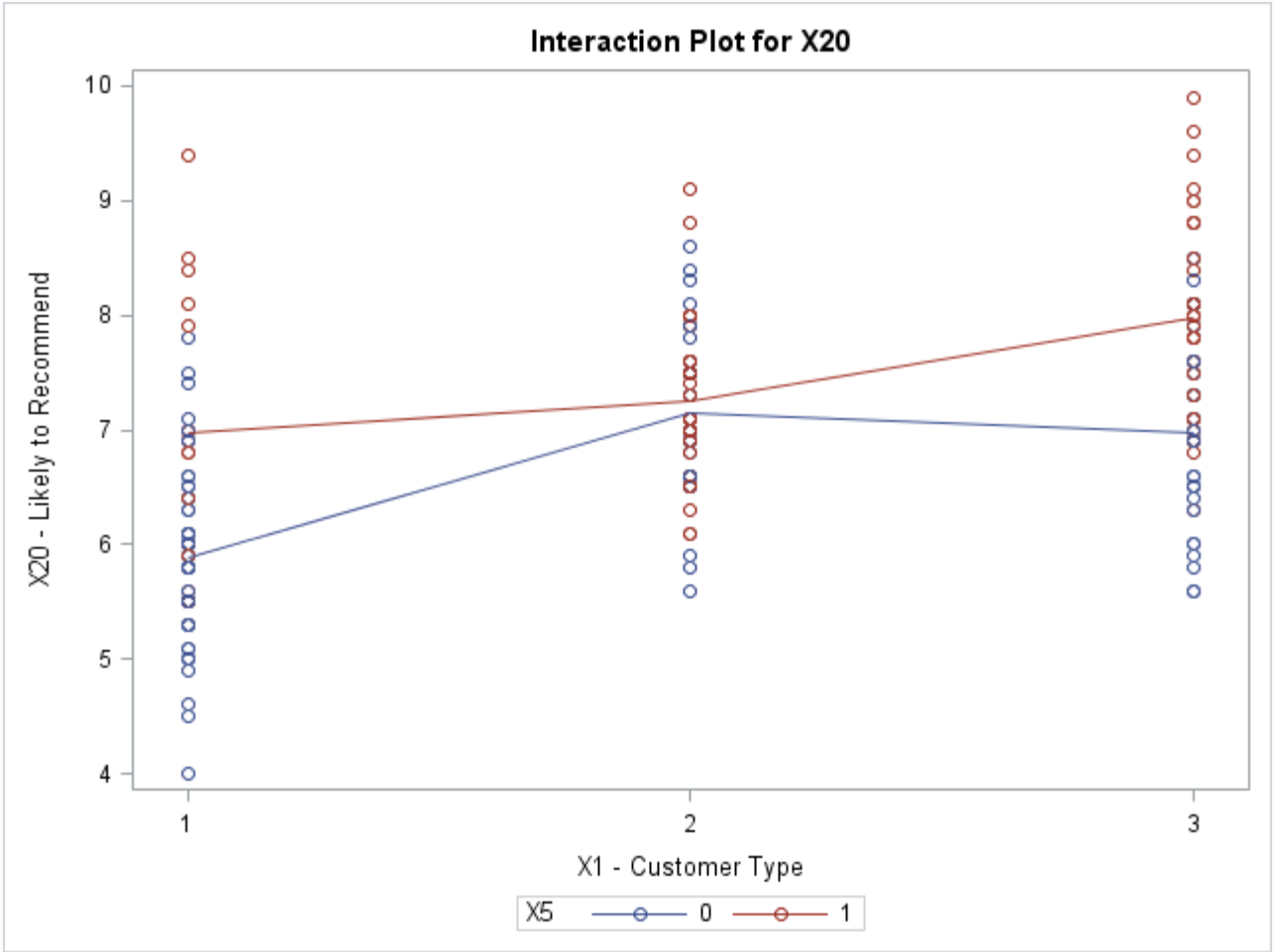
The SAS System

The GLM Procedure

Dependent Variable: X21 X21 - Likely to Purchase

Source	DF	Sum of Squares	Mean Square	F Value	Pr > F
Model	5	65.8793132	13.1758626	27.52	<.0001

Error	194	92.8956868	0.4788437		
Corrected Total	199	158.7750000			

R-Square	Coeff Var	Root MSE	X21 Mean
0.414922	9.027859	0.691985	7.665000

Source	DF	Type I SS	Mean Square	F Value	Pr > F
X1	2	53.54522978	26.77261489	55.91	<.0001
X5	1	8.88009771	8.88009771	18.54	<.0001
X1*X5	2	3.45398575	1.72699287	3.61	0.0290

| Source	DF	Type III SS	Mean Square	F Value	Pr > F
X1	2	26.72341606	13.36170803	27.90	<.0001
X5	1	9.76183371	9.76183371	20.39	<.0001
X1*X5	2	3.45398575	1.72699287	3.61	0.0290

Interaction Plot for X21

The SAS System

The GLM Procedure

Distribution of X19

Distribution of X20

Distribution of X21
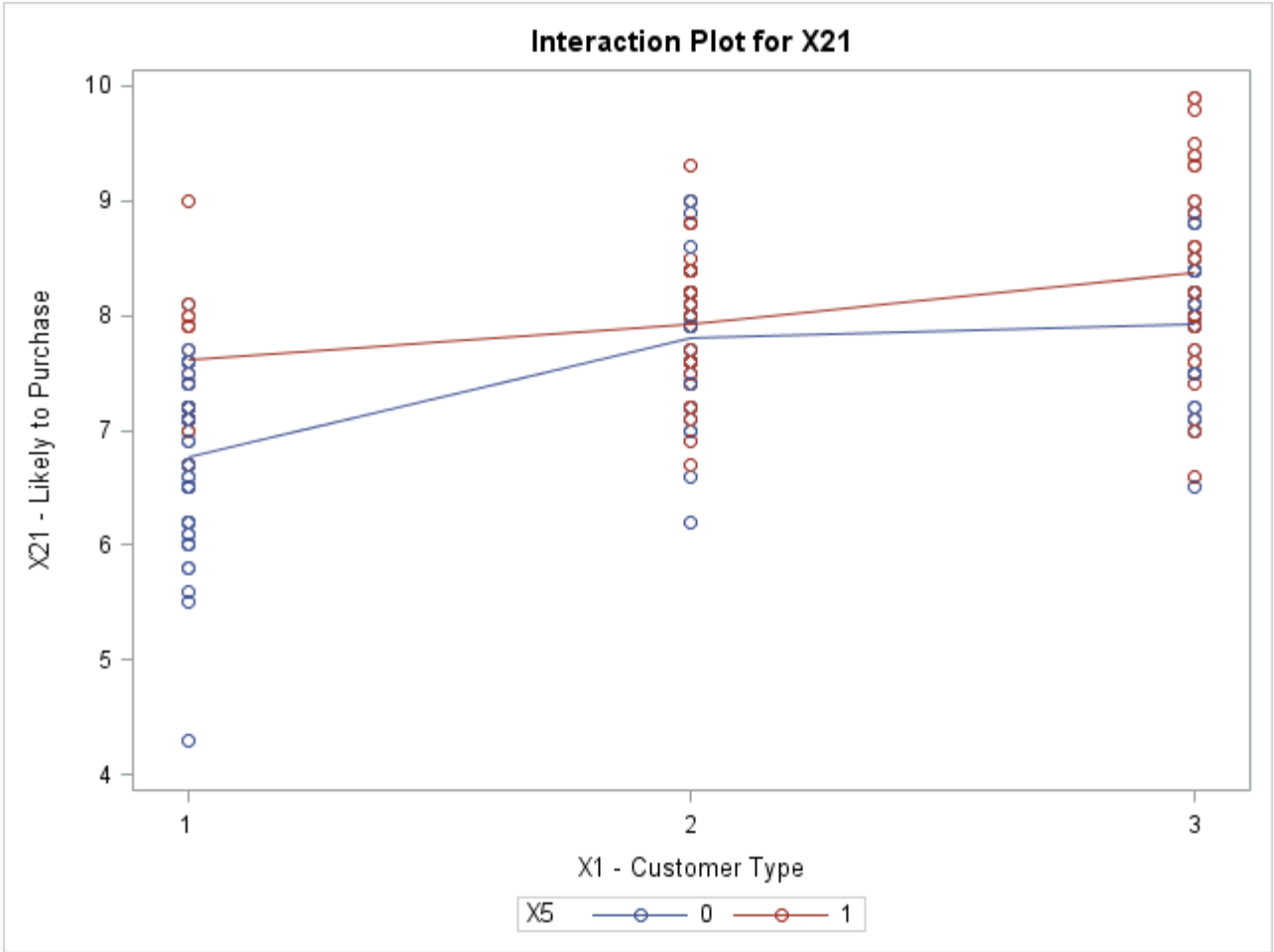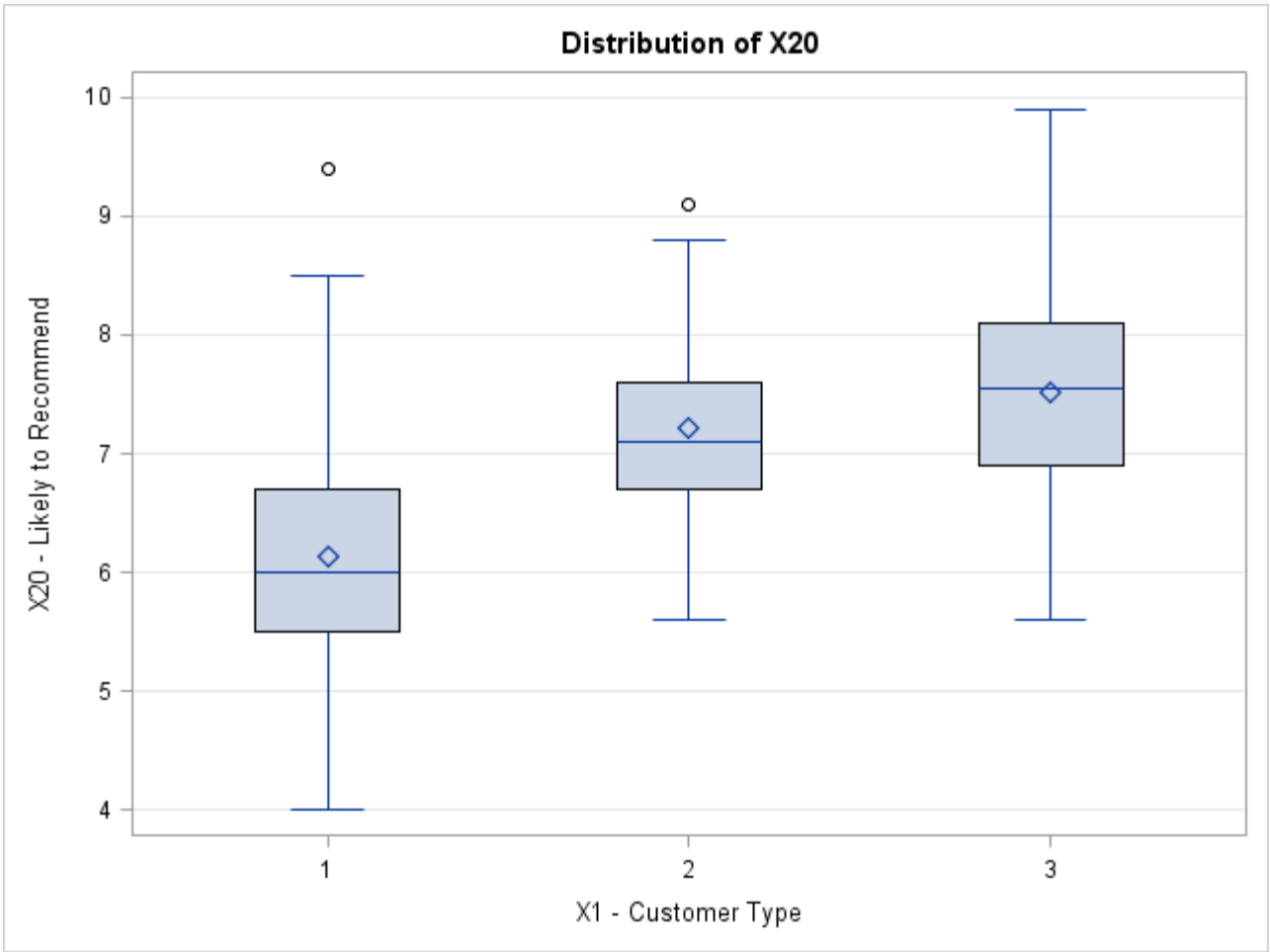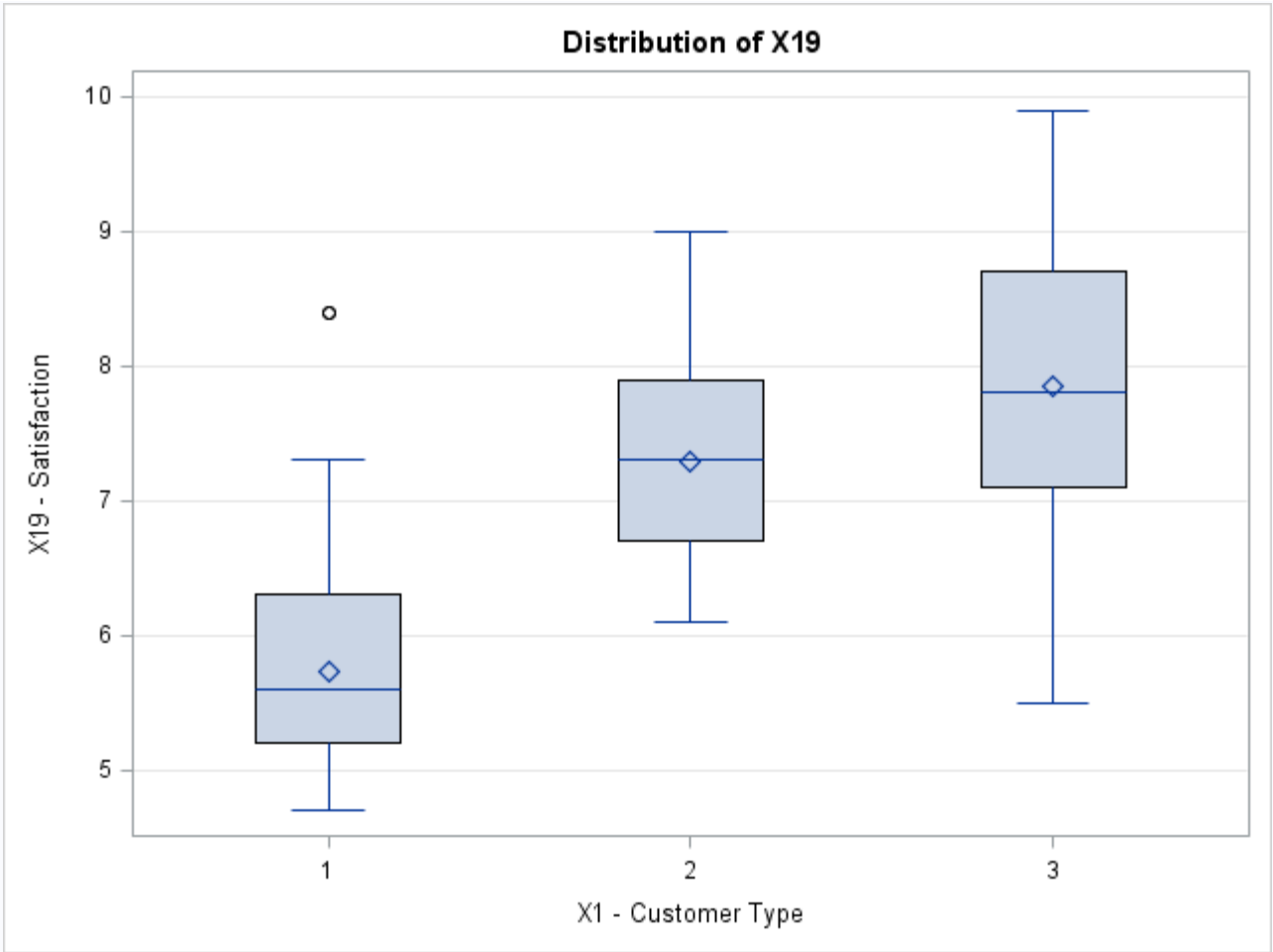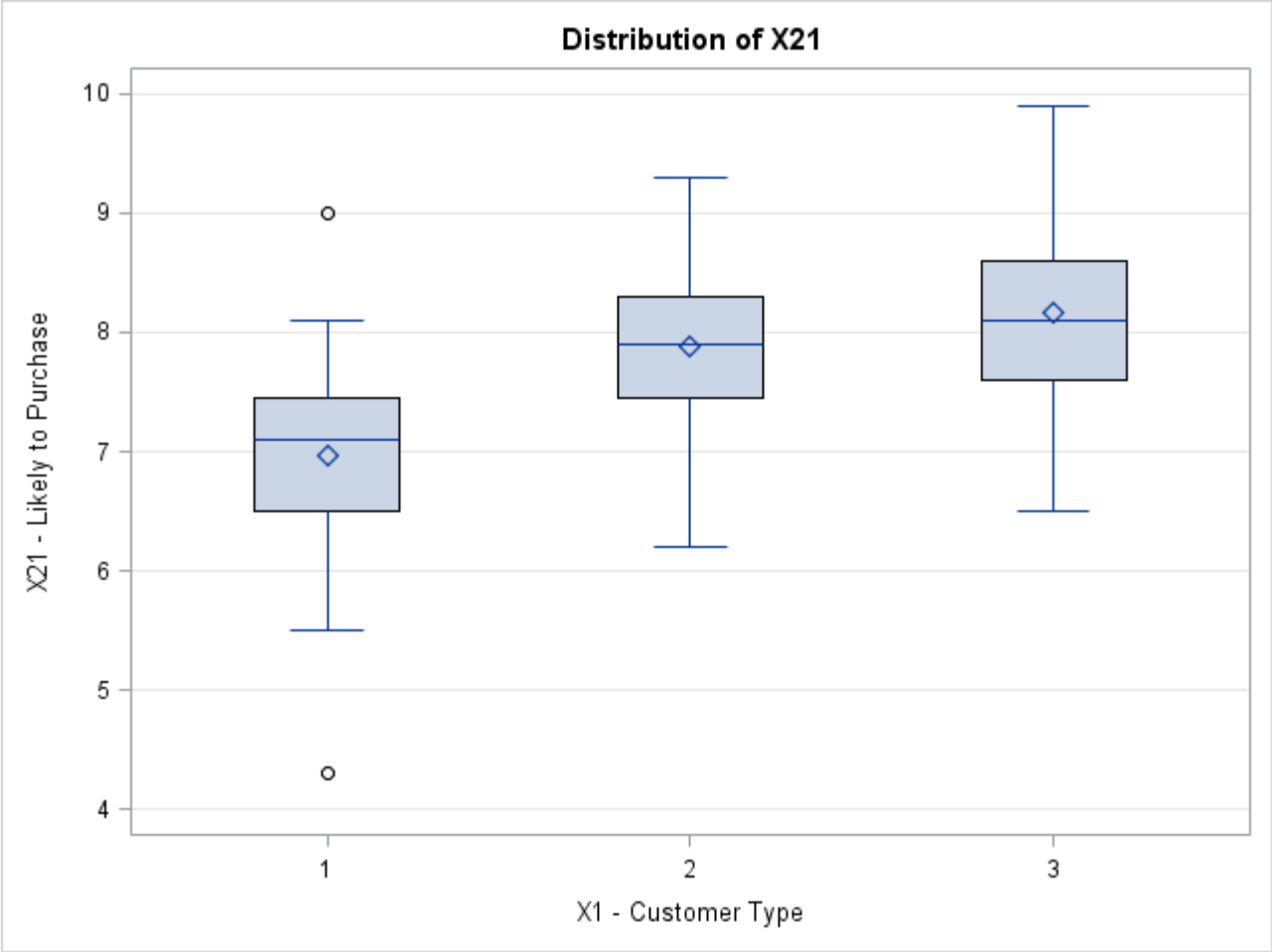
Level of X1	N	X19		X20		X21	
		Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
1	68	5.72941176	0.76432759	6.14117647	0.99494773	6.96176471	0.75981722
2	64	7.29375000	0.70775186	7.20937500	0.71441368	7.88281250	0.64304698
3	68	7.85294118	1.03324884	7.52205882	0.97610949	8.16323529	0.77746323

Distribution of X19

Distribution of X20

Distribution of X21
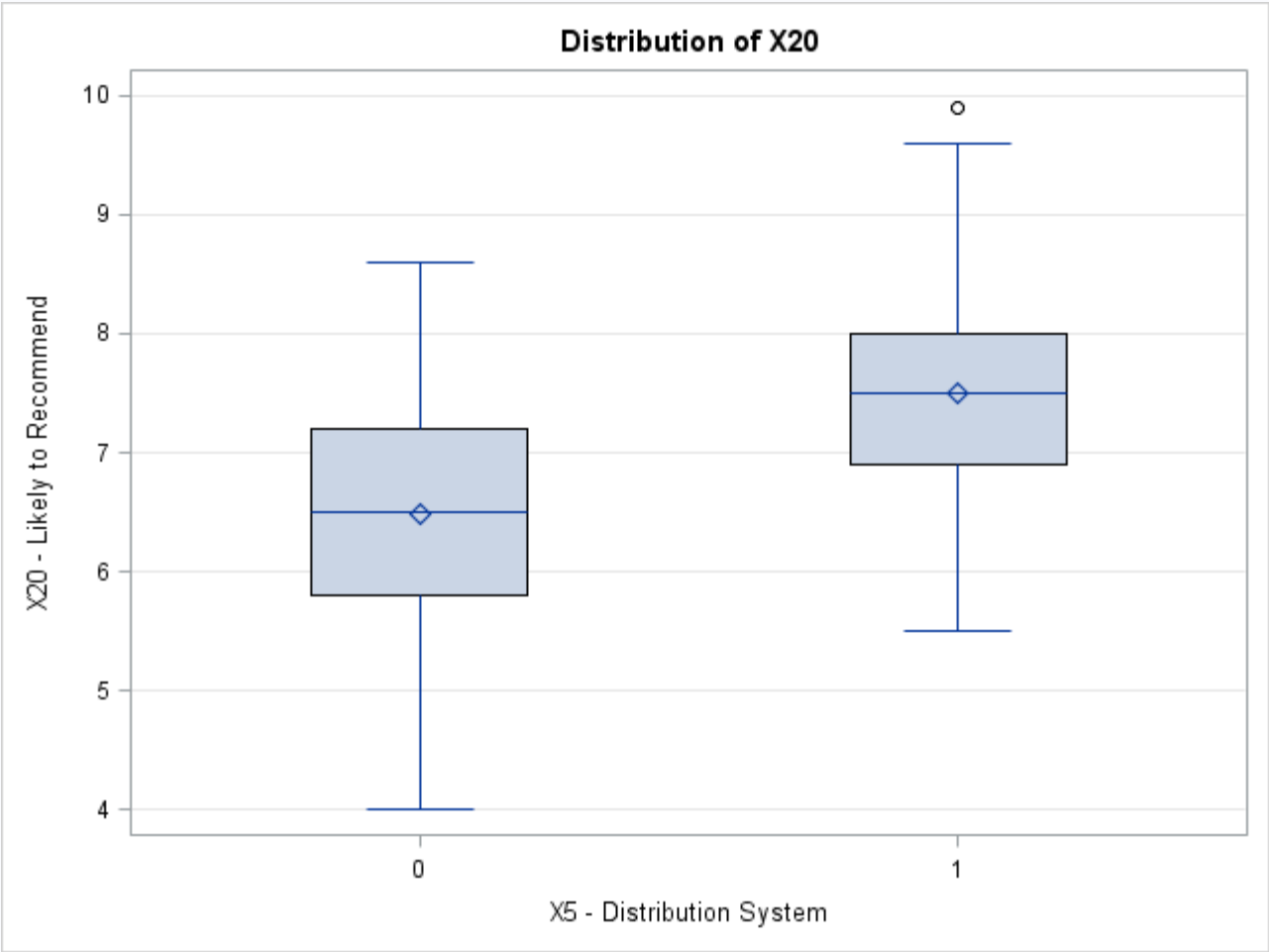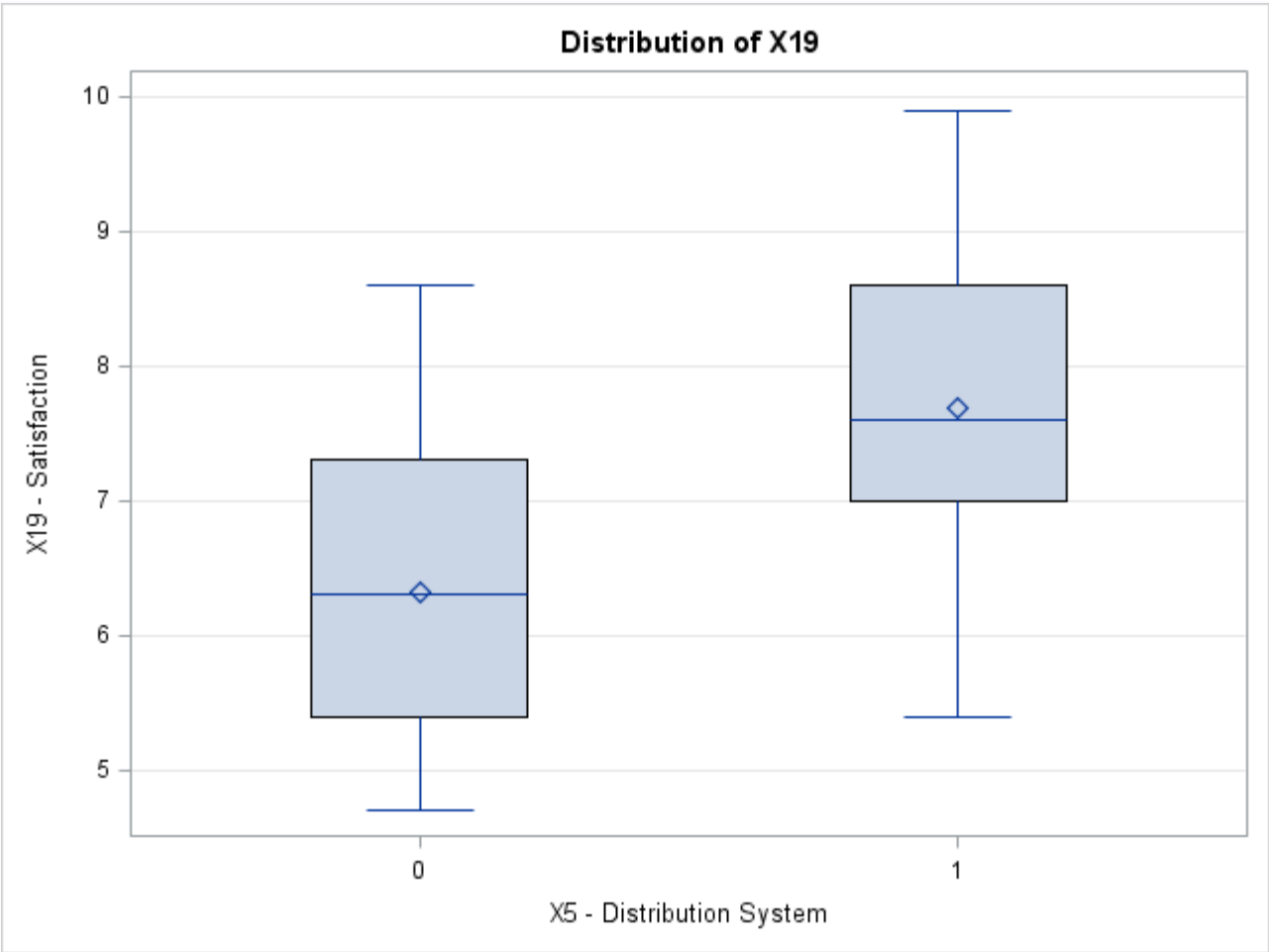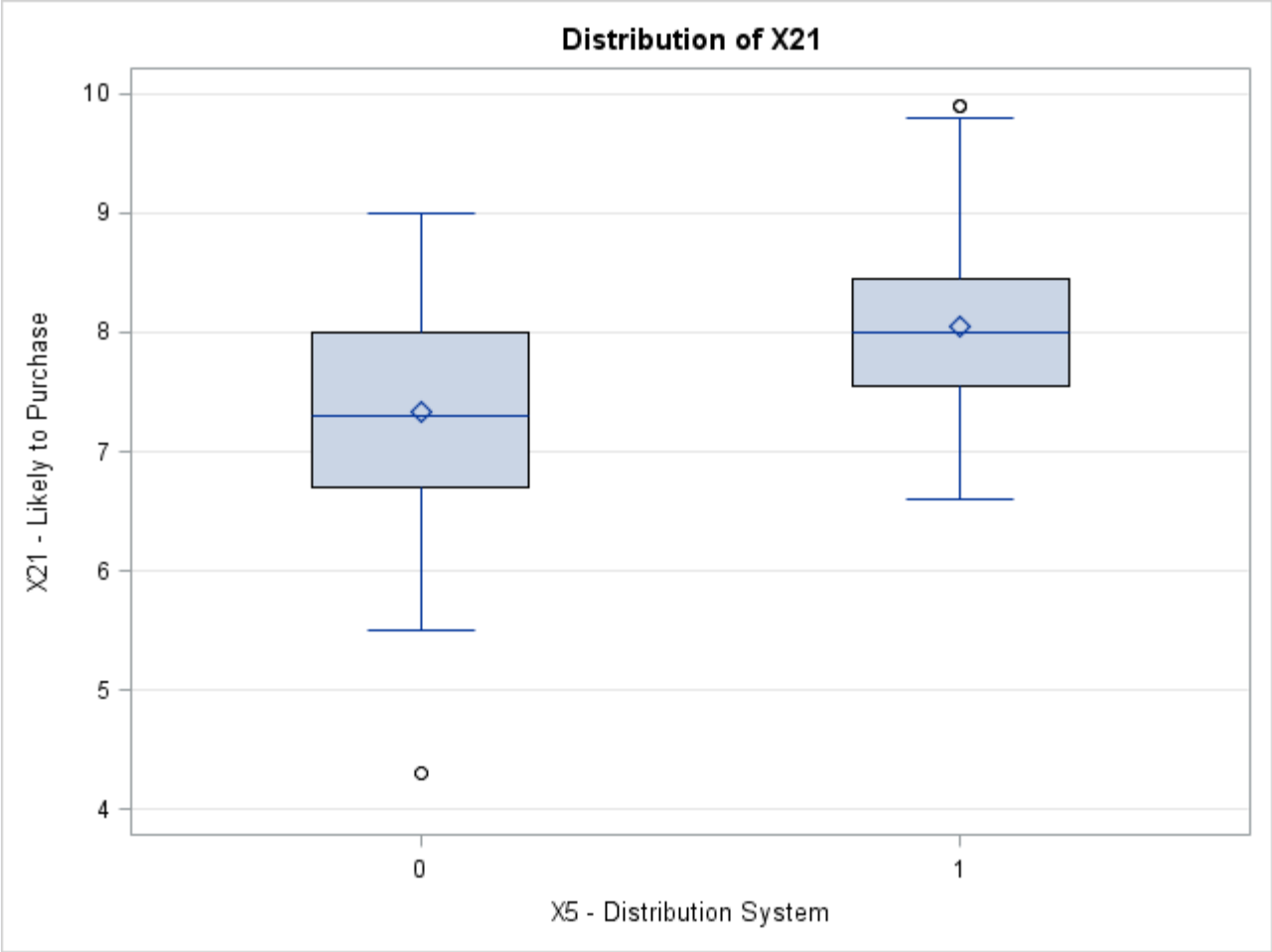
Level of X5	N	X19		X20		X21	
		Mean	**Std Dev**	**Mean**	**Std Dev**	**Mean**	**Std Dev**
0	108	6.32500000	1.03283703	6.48796296	0.98585487	7.33611111	0.88015062
1	92	7.68804348	1.04879233	7.49782609	0.92996257	8.05108696	0.74487178

Distribution of X19

Distribution of X20

Distribution of X21
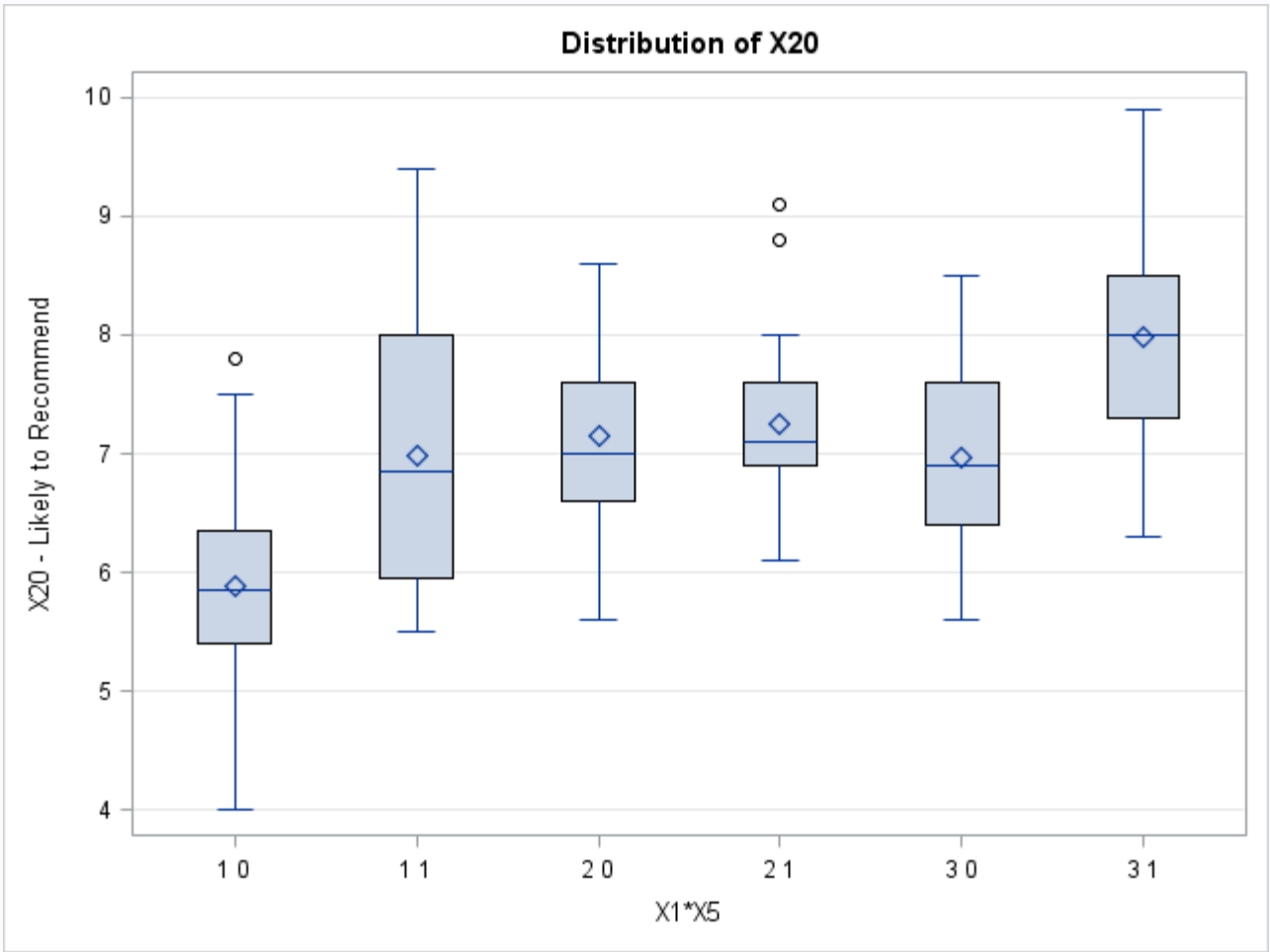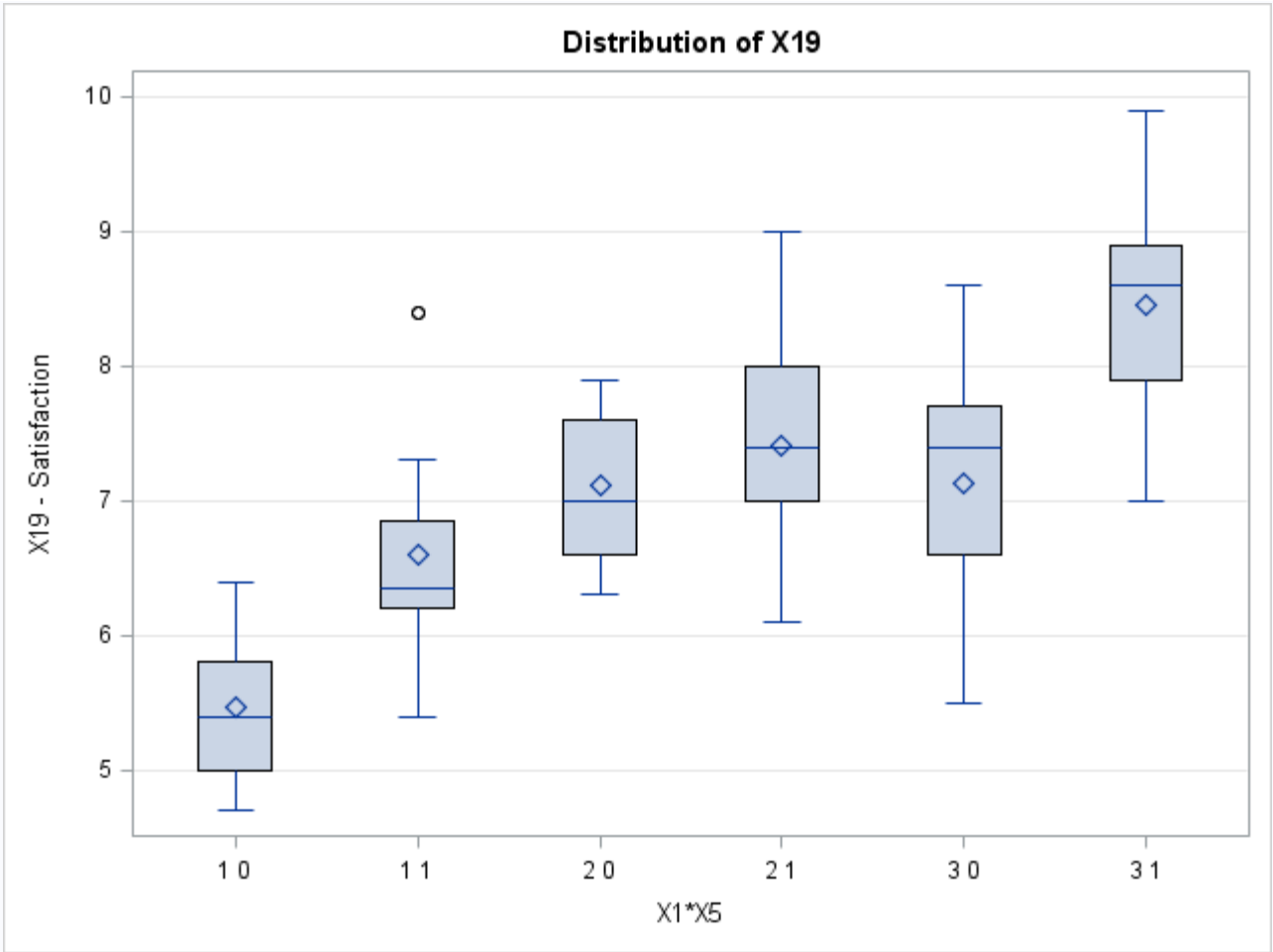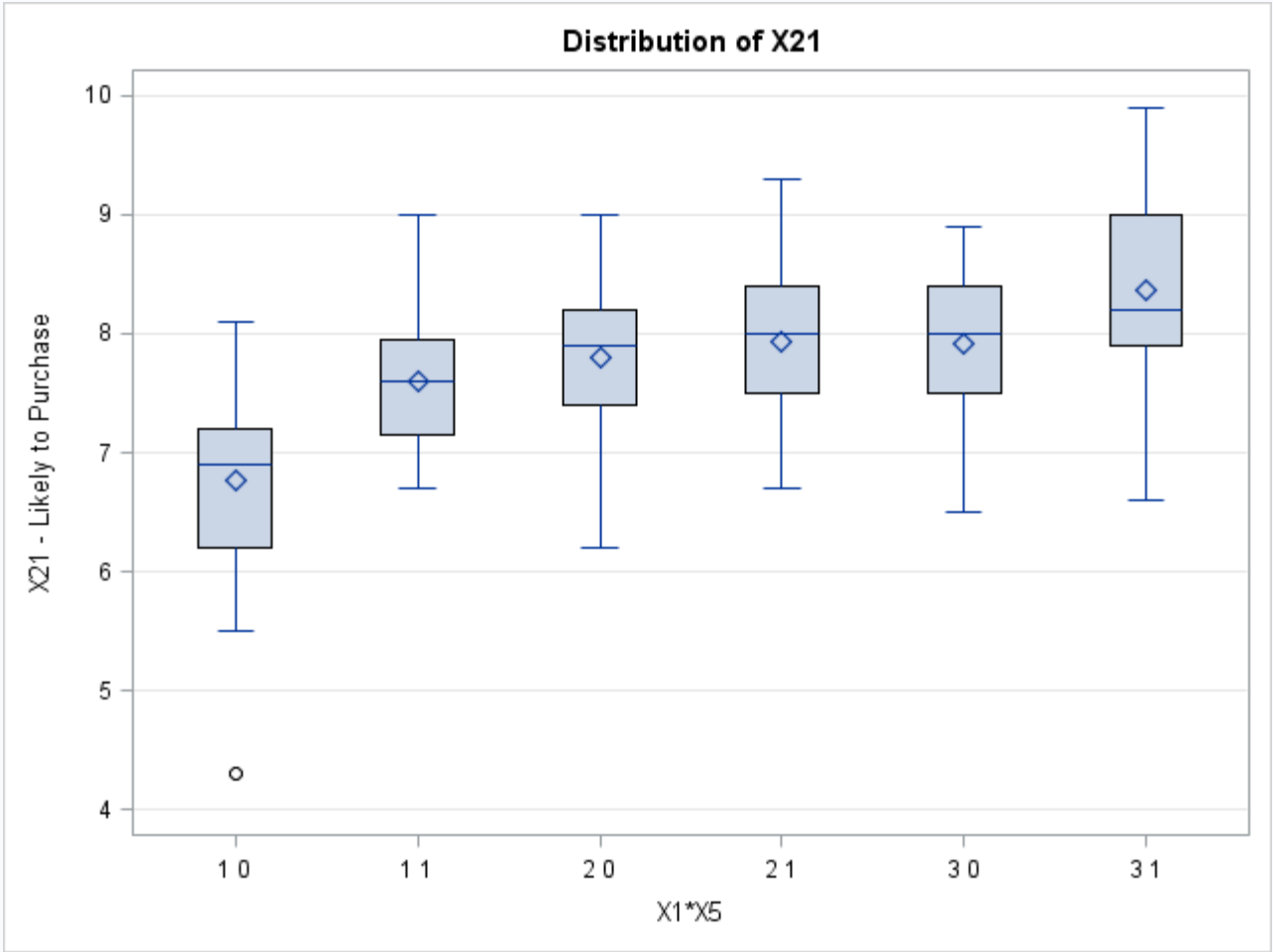
Level of X1	Level of X5	N	X19		X20		X21	
			Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
1	0	52	5.46153846	0.49947182	5.88269231	0.77275193	6.76346154	0.70210575
1	1	16	6.60000000	0.83904708	6.98125000	1.18615274	7.60625000	0.56858743
2	0	25	7.12000000	0.55075705	7.14400000	0.80264147	7.80400000	0.70974174
2	1	39	7.40512821	0.77864549	7.25128205	0.65929460	7.93333333	0.60058451
3	0	31	7.13225806	0.80348702	6.97419355	0.83545107	7.91935484	0.64777535
3	1	37	8.45675676	0.79181246	7.98108108	0.84650846	8.36756757	0.82531275

The SAS System

The GLM Procedure
Multivariate Analysis of Variance

Characteristic Roots and Vectors of: E Inverse * H, where H = Type III SSCP Matrix for X1 E = Error SSCP Matrix				
		Characteristic Vector V'EV=1		
Characteristic Root	Percent	X19	X20	X21
0.95146864	99.94	0.09806642	-0.00304920	0.01206516
0.00054051	0.06	-0.07082259	0.09392272	0.02721562
0.00000000	0.00	-0.03555258	-0.04741900	0.11713880

MANOVA Tests for the Hypothesis of No Overall X1 Effect

H = Type III SSCP Matrix for X1
E = Error SSCP Matrix

S=2 M=0 N=95

Statistic	Value	P-Value
Wilks' Lambda	0.51215775	<.0001
Pillai's Trace	0.48810565	<.0001
Hotelling-Lawley Trace	0.95200915	<.0001
Roy's Greatest Root	0.95146864	<.0001

Characteristic Roots and Vectors of: E Inverse * H, where
H = Type III SSCP Matrix for X5
E = Error SSCP Matrix

Characteristic Root	Percent	Characteristic Vector V'EV=1		
		X19	X20	X21
0.39843038	100.00	0.08734608	0.01998910	0.00188791
0.00000000	0.00	-0.04198489	-0.02542840	0.12084781
0.00000000	0.00	-0.08065221	0.10016571	0.00000000

MANOVA Tests for the Hypothesis of No Overall X5 Effect
H = Type III SSCP Matrix for X5
E = Error SSCP Matrix

S=1 M=0.5 N=95

Statistic	Value	P-Value
Wilks' Lambda	0.71508744	<.0001
Pillai's Trace	0.28491256	<.0001
Hotelling-Lawley Trace	0.39843038	<.0001
Roy's Greatest Root	0.39843038	<.0001

Characteristic Roots and Vectors of: E Inverse * H, where
H = Type III SSCP Matrix for X1*X5
E = Error SSCP Matrix

Characteristic Root	Percent	Characteristic Vector V'EV=1		
		X19	X20	X21
0.11182171	82.28	0.08012461	0.03541426	-0.01104265
0.02408938	17.72	-0.07081468	0.02360814	0.10763276
0.00000000	0.00	-0.06679951	0.09626953	-0.05386098

MANOVA Tests for the Hypothesis of No Overall X1*X5 Effect
H = Type III SSCP Matrix for X1*X5
E = Error SSCP Matrix

S=2 M=0 N=95

Statistic	Value	P-Value
Wilks' Lambda	0.87826785	0.0003
Pillai's Trace	0.12409795	0.0003
Hotelling-Lawley Trace	0.13591109	0.0003
Roy's Greatest Root	0.11182171	0.0007

INTERPRETING INTERACTION AND MAIN EFFECTS
With the interaction and main effects found to be statistically significant by both the multivariate and univariate tests, interpretation is still heavily reliant on the patterns of effects shown in the values of the six groups.

Interaction of X1 by X5
The nonparallel lines for each dependent measure notably portray the narrowing of the differences in distribution channels for customers of 1 to 5 years. Although the effects of X1 and X5 are still present, we do see some marked differences in these impacts depending on which specific sets of customers we examine.

Main Effect of X1
Its main effect is illustrated for all three purchase outcomes by the upward sloping lines across the three levels of X1 on the X axis. Here we can see that the effects are consistent with earlier findings in that all three purchase outcomes increase favorably as the length of the relationship with HBAT increases.

Main Effect of X5
The separation of the two lines representing the two distribution channels show us that the direct distribution channel generates more favorable purchase outcomes.