FORTE HOTEL DESIGN PROJECT

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Introduction

- Forte Hotels, the largest United Kingdom's hotel chain, is developing a new hotel chain in the United States mainly targeting European business people who come to United Sates for business.

- Forte's strategy in developing the new chain, named **Forte Executive Innes,** is twofold.
    - Attract customers by ambiance of a European hotel
    - American functionality and convenience.

- European business travelers in the United States will recognize the Forte name and associate it with comfort and service.

Objectives:

- Find the most attractive feature among customers

- Find most attractive amenity of each feature

- Find the best bundle from the rated bundles for the competitive market.

- Segment customers according to their preferences find the best group of customers to target.

- Find competitors for the best bundle from new and existing hotels
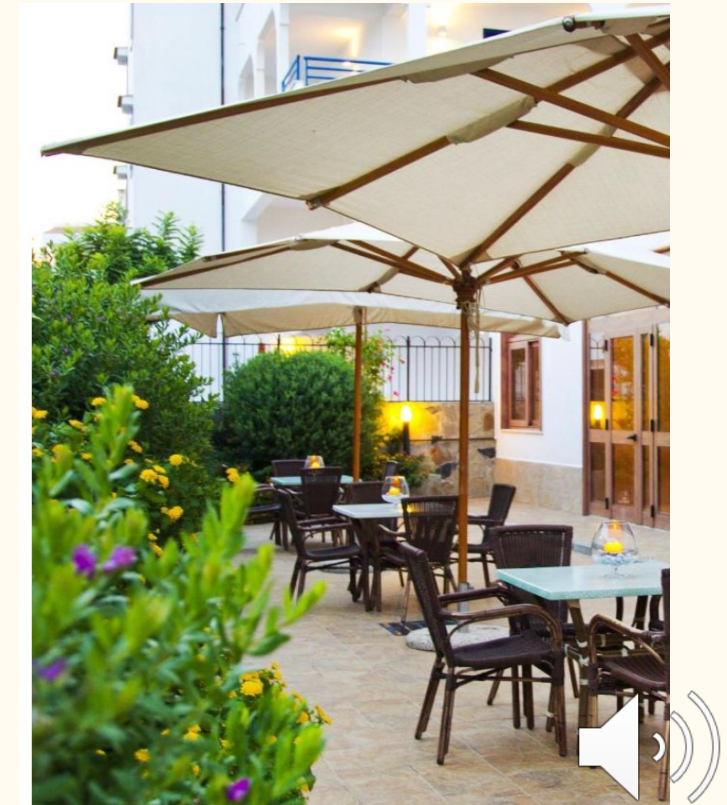
Data :

Design data

Attributes	Level01	Level02	Level03	Level04
Room	Small_Suite	Large_Room	Room_Office	
Bus_Ameniti	Internet_access	Speaker_phone	Room_fax	
Leisure	Exercise_room	Pool	Exercise_room_and_Pool	
Extras	Shoe_shine	Tape_library	Fruit_and_cheese	Newspaper
Rest_Deliver	Yes	No		

Bundles :16 most valued bundles of rooms that were identified for customers to rate.

Attributes	Bundle01	Bundle02	Bundle03	Bundle04	Bundle05	Bundle06	Bundle07	Bundle08	
Room	Small_Suite	Large_Room	Room_Office	Large_Room	Small_Suite	Large_Room	Room_Office	Large_Room	
Bus_Amenities	Internet_access	Speaker_phone	Room_fax	Speaker_phone	Speaker_phone	Internet_access	Speaker_phone	Room_fax	
Leisure	Exercise_room	Exercise_room_and	Pool	Pool	Pool	Pool	Exercise_room_and	Exercise_room	Exercise_room_a
Extras	Shoe_shine	Shoe_shine	Shoe_shine	Shoe_shine	Tape_library	Tape_library	Tape_library	Tape_library	
Rest_Delivery	Yes	No	Yes	No	Yes	No	Yes	No	

	Bundle09	Bundle10	Bundle11	Bundle12	Bundle13	Bundle14	Bundle15	Bundle16
	Small_Suite	Large_Room	Room_Office	Large_Room	Small_Suite	Large_Room	Room_Office	Large_Room
	Room_fax	Speaker_phone	Internet_access	Speaker_phone	Speaker_phone	Room_fax	Speaker_phone	Internet_access
	Exercise_room_and	Exercise_room	Pool	Pool	Pool	Pool	Exercise_room	Exercise_room_and
	Fruit_and_cheese	Fruit_and_cheese	Fruit_and_cheese	Fruit_and_cheese	Newspaper	Newspaper	Newspaper	Newspaper
	No	Yes	No	Yes	No	Yes	No	Yes

Exercise_room_and_Pool

* All data, including column/row names were formatted to have **no spaces and '+' character** for analysis.
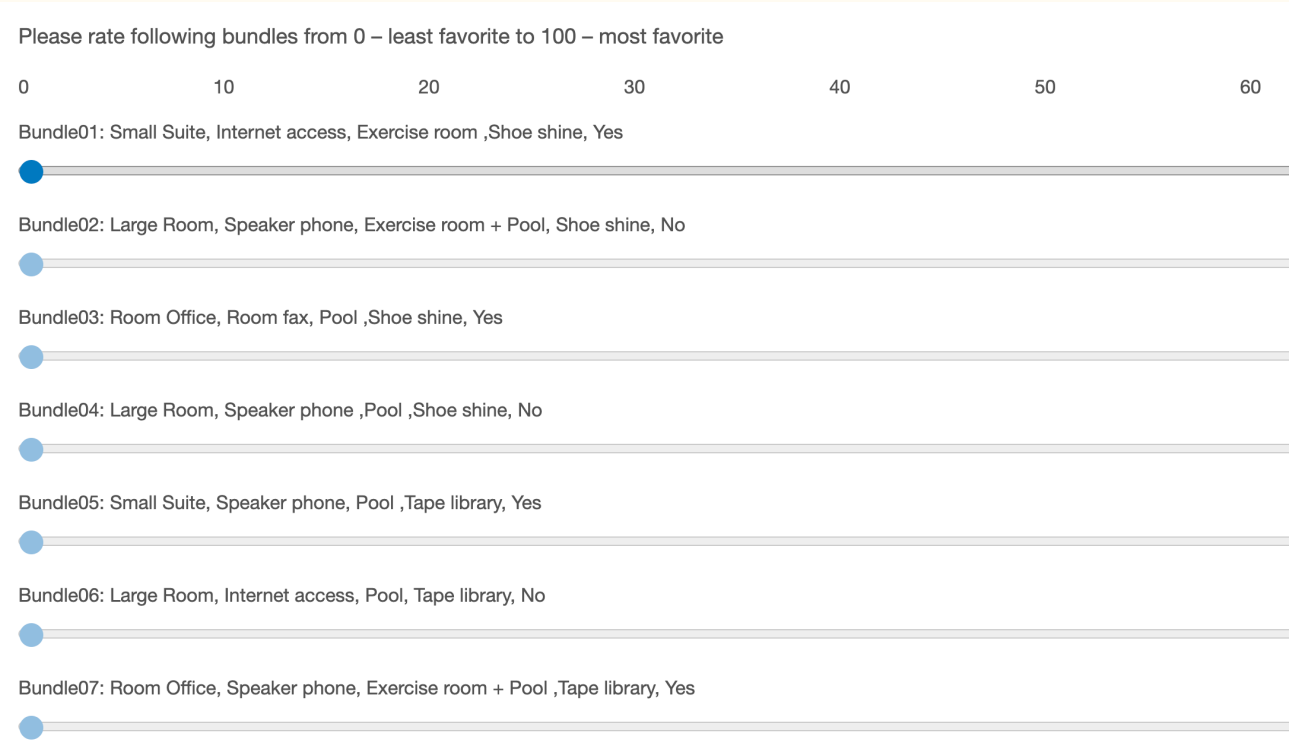
Data :

preference ratings given by 40 customers to 16 bundles.

Respondents / Ratings	Bundle 1	Bundle 2	Bundle 3	Bundle 4	Bundle 5	Bundle 6	Bundle 7	Bundle 8	Bundle 9	Bun
Amanda	56	48	31	47	24	69	34	22	28	
Ann	25	58	49	71	58	63	38	36	34	
Bruce	67	2	53	16	67	46	39	34	43	
Byron	38	64	50	69	50	49	57	27	29	
Byung	64	47	83	52	73	21	66	17	66	
Colleen	43	50	32	36	56	32	46	20	84	
Courtney	22	54	1	32	39	29	50	27	49	
Daniel	18	34	42	27	27	18	32	50	60	
Dierdre	56	34	44	30	48	11	61	15	39	
Elio	48	54	35	26	24	30	42	51	75	
Eugene	61	31	35	47	32	56	22	85	7	
Frank	50	4	66	7	44	19	60	26	31	
Gabriel	55	50	60	46	34	21	33	43	52	
George	63	48	45	62	62	54	52	59	4	
Gina	57	44	60	65	50	66	16	50	44	
Hans	21	87	17	57	24	38	48	53	75	
Hector	17	28	73	32	28	32	61	55	39	
Jin Hyuk	41	47	18	37	48	19	45	20	57	
Jose	25	18	72	24	38	30	43	39	47	
Kevin	32	44	57	44	35	21	63	9	22	
Lawrence	80	61	3	52	73	53	17	53	86	

Survey Data:

Please rate following bundles from 0 – least favorite to 100 – most favorite

0	10	20	30	40	50	60

Bundle01: Small Suite, Internet access, Exercise room ,Shoe shine, Yes

Bundle02: Large Room, Speaker phone, Exercise room + Pool, Shoe shine, No

Bundle03: Room Office, Room fax, Pool ,Shoe shine, Yes

Bundle04: Large Room, Speaker phone ,Pool ,Shoe shine, No

Bundle05: Small Suite, Speaker phone, Pool ,Tape library, Yes

Bundle06: Large Room, Internet access, Pool, Tape library, No

Bundle07: Room Office, Speaker phone, Exercise room + Pool ,Tape library, Yes

https://qfreeaccountssjc1.az1.qualtrics.com/surveys/SV_eIP1iAIHIdzJwbQ/edit

Conjoint Analysis (all respondents)

Partworth utilities for levels and importance of attributes for all respondents

Attributes	Level names	Partworth utility	Importance
Room	Small_Suite	3	29.2
	Large_Room	-3.2438	
	Room_Office	0.2438	
Bus amenities	Internet_access	-1.4687	21.32
	Speaker_phone	0.9063	
	Room_fax	0.5625	
Leisure	Exercise_room	-0.9979	19.74
	Pool	0.3896	
	Exercise_room_and_Pool	0.6083	
Extras	Shoe_shine	0.1047	15.94
	Tape_library	-1.2641	
	Fruit_and_cheese	0.8859	
	Newspaper	0.2734	
Rest_Delivery	Yes	0.0078	13.8
	No	-0.0078	

Part-worth utilities from Conjoint Analysis (all respondents)

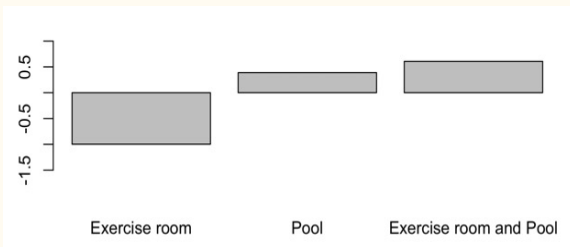

Small_Suite	3
Large_Room	-3.2438
Room_Office	0.2438

Part worth utility of Small suite is 2.76 higher than Room office and 6.24 higher than Large room.
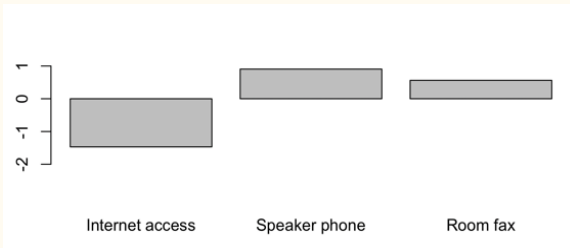
Internet_access	-1.4687
Speaker_phone	0.9063
Room_fax	0.5625

Part worth utility of Speaker phone is 0.3 higher than Room fax and 2.4 higher than Internet access.
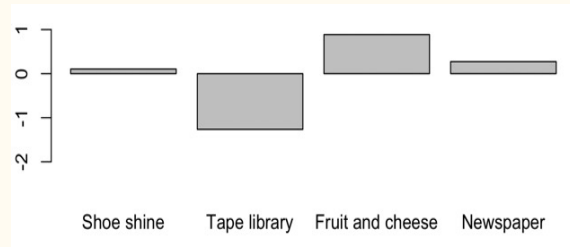

Exercise_room	-0.9979
Pool	0.3896
Exercise_room_and_Pool	0.6083

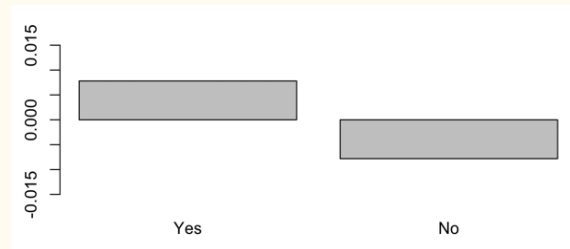**Part worth utility of exercise room and pool** is 0.2 higher than Pool and 1.7 higher than Exercise room.

Ctd..

Shoe_shine	0.1047
Tape_library	-1.2641
Fruit_and_cheese	0.8859
Newspaper	0.2734

Yes	0.0078
No	-0.0078

Part worth utility of Fruit and cheese is 0.6 higher than newspaper, 0.8 higher than shoe shine and 2.2 higher than Tape library.

Part worth utility of Restaurant delivery is 0.016 higher than no restaurant delivery.

Preference Share (for each bundle)

$\text{Pref}_i = \beta_0 + \beta_1(\text{Small\_Suite})_i + \beta_2(\text{Large\_Room})_i + \beta_3(\text{Room\_Office})_i + \beta_4(\text{Internet\_access})_i + \beta_5(\text{Speaker\_phone})_i + \beta_6(\text{Room\_fax})_i + \beta_7(\text{Exercise\_room})_i + \beta_8(\text{Pool})_i + \beta_9(\text{Exercise\_room\_and\_Pool})_i + \beta_{10}(\text{Shoe\_shine})_i + \beta_{11}(\text{Tape\_library})_i + \beta_{12}(\text{Fruit\_and\_cheese})_i + \beta_{13}(\text{Newspaper})_i + \beta_{14}(\text{Yes})_i + \beta_{15}(\text{No})_i + \varepsilon i$

Where β_i = Partworth utility of each level(considering all respondents)

εi = error term

	Bundle 01	Bundle 02	Bundle 03	Bundle 04	Bundle 05	Bundle 06	Bundle 07	Bundle 08	Bundle 09	Bundle 10	Bundle 11	Bundle 12	Bundle 13	Bundle 14	Bundle 15	Bundle 16
Preference score	44.33	42.06	45.00	41.84	46.73	38.09	44.19	38.74	48.74	41.25	43.73	42.63	48.25	41.68	44.11	39.87

Total utility for each respondent (bundle choice)

	Bundle 01	Bundle 02	Bundle 03	Bundle 04	Bundle 05	Bundle 06	Bundle 07	Bundle 08	Bundle 09	Bundle 10	Bundle 11	Bundle 12	Bundle 13	Bundle 14	Bundle 15	Bundle 16
1	56.13	48.13	30.88	46.88	24.00	69.00	34.00	22.00	28.00	29.75	76.00	36.25	26.88	16.13	29.13	57.88
2	25.00	57.88	49.00	71.13	58.13	62.75	37.88	36.25	34.00	51.63	38.00	80.38	48.88	73.75	13.13	58.25
3	66.88	2.00	53.25	15.88	66.88	46.25	39.00	33.88	43.00	31.38	48.88	37.75	55.25	60.88	34.88	53.00
4	38.00	63.88	49.88	69.25	50.13	49.00	57.00	26.88	29.13	22.00	58.00	32.88	69.75	24.13	71.13	30.00
5	63.88	47.50	83.00	51.63	73.38	21.00	65.75	16.88	65.88	43.25	57.25	56.63	68.88	47.25	52.00	33.88
6	43.00	50.00	32.00	36.00	56.00	32.25	46.00	19.75	84.13	5.13	45.88	17.88	72.88	17.13	36.13	30.88
7	22.00	54.38	1.00	31.63	39.13	28.75	49.88	27.25	48.75	30.88	19.25	27.13	37.13	4.00	28.88	32.00
8	17.88	33.88	42.13	27.13	27.13	17.88	31.88	50.13	60.00	13.00	22.00	10.00	51.00	44.75	52.00	22.25
9	55.88	33.75	44.25	30.13	47.75	11.13	61.13	15.00	39.00	70.38	53.88	57.75	45.38	26.75	67.75	39.13
10	48.13	54.13	34.75	26.00	24.00	30.00	42.13	50.88	75.00	60.00	28.13	47.88	24.88	59.38	27.00	78.75
26	37.13	52.00	63.00	56.88	15.75	48.13	28.13	66.00	38.00	26.88	46.88	22.25	35.13	49.00	57.00	30.88
36	23.88	25.13	35.25	16.75	35.13	13.13	57.75	32.00	61.00	51.00	58.88	40.13	45.00	22.75	70.13	23.13
37	44.00	25.25	60.00	33.75	32.00	41.00	37.00	60.00	49.88	23.13	61.13	14.88	53.13	42.13	74.88	22.88
38	32.00	42.88	38.13	27.00	46.88	47.00	56.00	25.13	75.00	2.88	56.88	20.25	59.13	33.75	35.00	54.13
39	62.13	75.13	35.88	52.88	45.00	37.00	54.00	73.00	54.00	75.75	7.00	51.25	35.88	55.13	47.13	65.88
40	57.00	37.75	92.00	53.25	38.88	44.88	40.13	49.13	24.00	40.00	45.00	47.00	26.13	72.88	35.88	46.13
Total	1717.25	1634.13	1769.00	1626.63	1845.13	1454.75	1733.63	1527.50	1921.50	1620.13	1673.25	1669.13	1903.13	1651.00	1735.13	1536.75

The most preferred bundle for Elio (10th) : Bundle 16
The most preferred bundle for Nina (26th) : Bundle 08
The most preferred bundle of surveyed population : Bundle 09

Frequency of purchase

Bundle_name	Freq
Bundle01	3
Bundle02	2
Bundle03	6
Bundle04	1
Bundle05	2
Bundle06	1
Bundle07	1
Bundle08	2
Bundle09	6
Bundle10	3
Bundle11	3
Bundle12	2
Bundle13	1
Bundle14	2
Bundle15	4
Bundle16	2

The most preferred bundle

■ Bundle 09

Attributes	Bundle 9
Room	Small Suite
Bus Amenities	Room fax
Leisure	Exercise room + Pool
Extras	Fruit and cheese
Rest Delivery	No

Attributes	Level names	Partworth utility	Importance
Room	Small_Suite	3	29.2
	Large_Room	-3.2438	
	Room_Office	0.2438	
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	Speaker_phone	0.9063	
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	Tape_library	-1.2641	
	Fruit_and_cheese	0.8859	
	Newspaper	0.2734	
Rest_Delivery	Yes	0.0078	13.8
	No	-0.0078	

Market Share for Bundle09 (to identify competitors)

With existing 5 hotels

Bundle name	Freq	share_percentage %
Courtyard_by_Marriott	6	15
Nittany_Lion_Inn	4	10
Atherton_Hilton	3	7.5
Toftrees	10	25
Scanticon	10	25
bundles_data$Bundle09	7	17.5
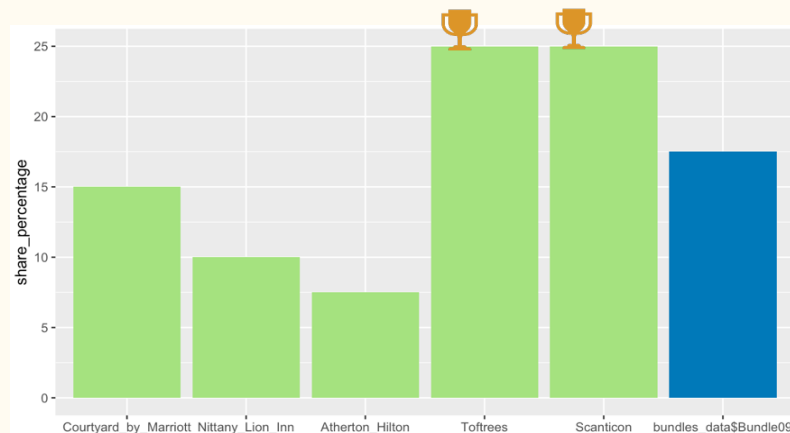
With new 4 hotels

Bundle name	Freq	share_percentage %
Professional01	9	22.5
Professional02	10	25
Tourist	7	17.5
Deluxe	4	10
bundles_data$Bundle09	10	25
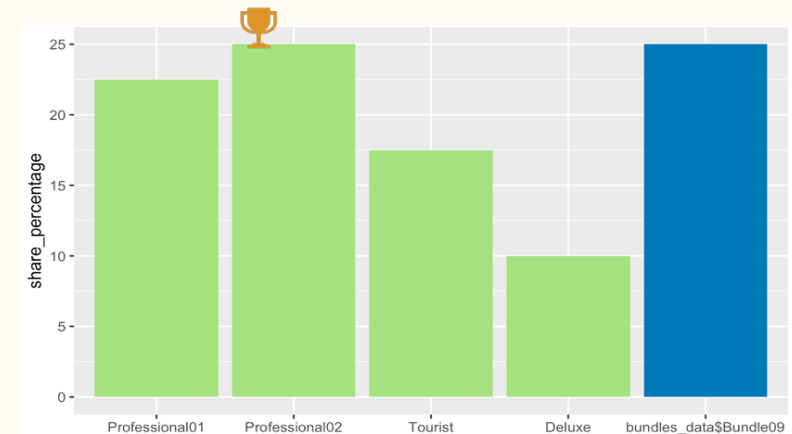
With existing 5 hotels

Attributes	Courtyard_by_Marriott	Nittany_Lion_Inn	Atherton_Hilton	Toftrees 🏆	Scanticon 🏆	Bundle09
Room	Small_Suite	Large_Room	Large_Room	Small_Suite	Room_Office	Small_Suite
Bus_Amenities	Speaker_phone	Speaker_phone	Speaker_phone	Speaker_phone	Room_fax	Room_fax
Leisure	Exercise_room_and_Pool	Exercise_room	Exercise_room	Exercise_room_and_Pool	Exercise_room_and_Pool	Exercise_room_and_Pool
Extras	Newspaper	Newspaper	Tape_library	Newspaper	Shoe_shine	Fruit_and_cheese
Rest_Delivery	Yes	Yes	No	No	Yes	No

With new 4 hotels

Attributes	Professional01	Professional02 🏆	Tourist	Deluxe	Bundle09
Room	Room_Office	Small_Suite	Large_Room	Large_Room	Small_Suite
Bus_Amenities	Internet_access	Room_fax	Speaker_phone	Internet_access	Room_fax
Leisure	Exercise_room	Exercise_room	Exercise_room_and_Pool	Exercise_room_and_Pool	Exercise_room_and_Pool
Extras	Fruit_and_cheese	Tape_library	Tape_library	Tape_library	Fruit_and_cheese
Rest_Delivery	No	Yes	No	Yes	No

Market Segmentation (to identify target market)

K-Means Clustering Results
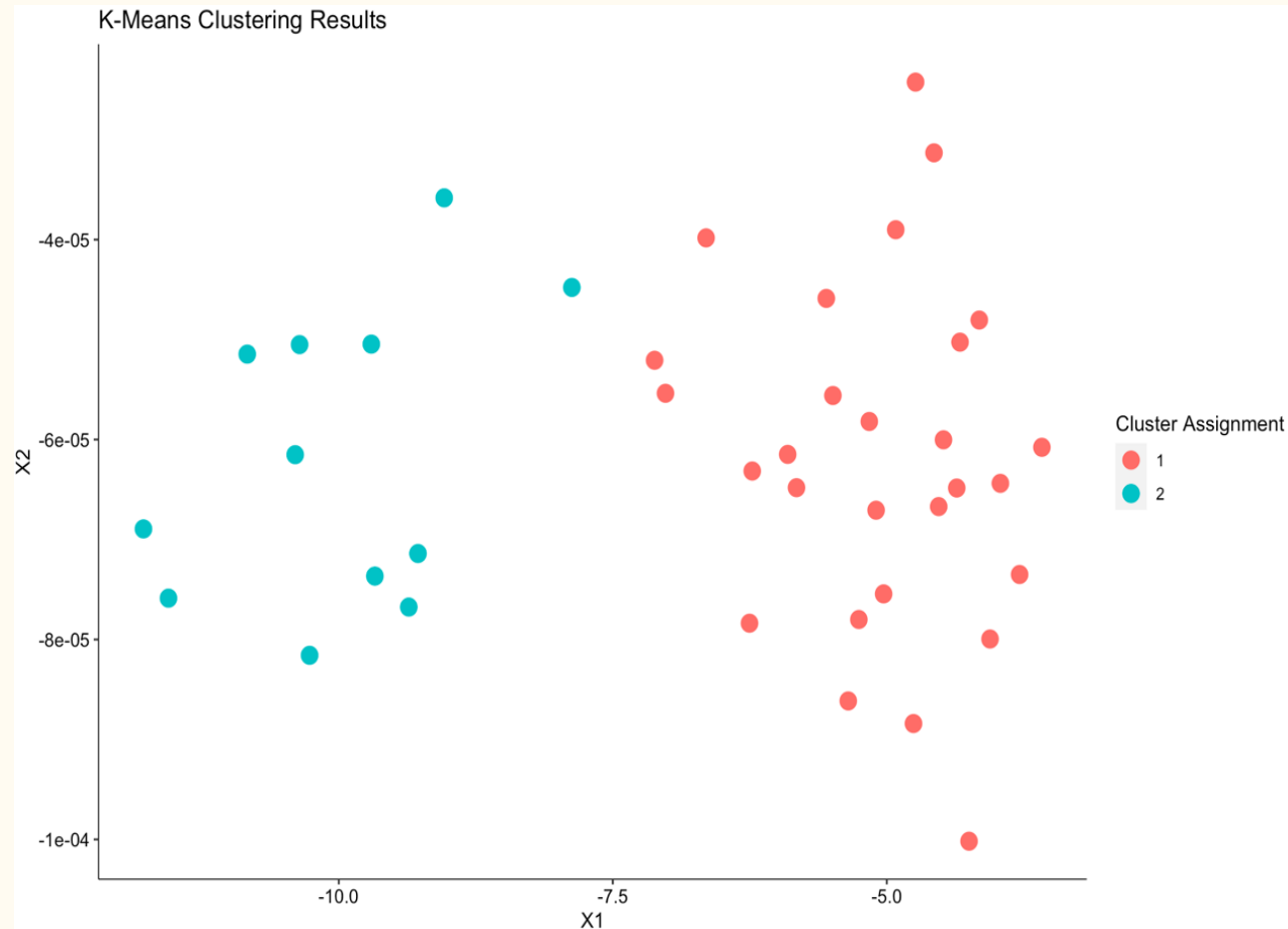
	Respondents	Cluster		Respondents	Cluster
1	Amanda	1	21	Lawrence	2
2	Ann	2	22	Marina	1
3	Bruce	1	23	Martina	2
4	Byron	1	24	Michael	1
5	Byung	1	25	Nicholas	1
6	Colleen	1	26	Nissa	1
7	Courtney	1	27	Oliver	2
8	Daniel	1	28	Peony	1
9	Dierdre	1	29	Robert	1
10	Elio	2	30	Sally	1
11	Eugene	2	31	Saulo	1
12	Frank	1	32	Scott	2
13	Gabriel	1	33	Shawn	1
14	George	2	34	Stacy	1
15	Gina	2	35	Sukhdeep	1
16	Hans	2	36	Thomas	1
17	Hector	1	37	Tiffany	1
18	Jin Hyuk	1	38	Traci	1
19	Jose	1	39	Trevor	2
20	Kevin	1	40	Vladimir	2

Properties of segments

Step 1 : Comparison of Mean rating value of each bundle for each cluster with the overall mean

	cluster_1	cluster_2	overall_mean
Bundle01	41.85	50.13	44.33
Bundle02	36.81	54.29	42.05
Bundle03	47.55	39.04	45.00
Bundle04	36.00	55.46	41.85
Bundle05	45.18	50.34	46.75
Bundle06	32.05	52.20	38.05
Bundle07	46.81	38.07	44.18
Bundle08	31.89	54.72	38.78
Bundle09	50.76	44.02	48.73
Bundle10	32.71	61.17	41.23
Bundle11	48.41	32.81	43.75
Bundle12	35.23	59.92	42.65
Bundle13	48.89	46.76	48.25
Bundle14	34.13	59.30	41.65
Bundle15	47.19	36.91	44.10
Bundle16	32.58	56.86	39.90

bundles prominent in cluster_1	bundles prominent in cluster_2	cluster_1 properties	cluster_2 properties
Bundle03	Bundle01	Room Office	Small Suite
Bundle07	Bundle02	Room fax	Internet access
Bundle09	Bundle04	Pool	Exercise room
Bundle11	Bundle05	Shoe shine	Shoe shine
Bundle13	Bundle06	Restaurant Delivary	Restaurant Delivary
Bundle15	Bundle08	Speaker phone	Large Room
	Bundle10	Exercise room + Pool	Speaker phone
	Bundle12	Tape library	Exercise room + Pool
	Bundle14	Small Suite	Pool
	Bundle16	Fruit and cheese	No Restaurant Delivary
		No Restaurant Delivary	Tape library
		Internet access	Internet access
		Newspaper	Room fax
		Exercise room	Fruit and cheese
			Newspaper

>> The main difference between two clusters is due to room type

Properties of segments

Step 2 : Conjoint analysis for 2 clusters

| Attributes	Level names	Cluster_1		Cluster_2	
		Partworth utility	Importance	Partworth utility	Importance
Room	Small Suite	3.9747	28.07	0.7257	31.85
	Large Room	-8.7708		9.6528	
	Room Office	4.7961		-10.3785	
Bus amenities	Internet access	-1.5789	23.77	-1.2118	15.61
	Speaker phone	0.8006		1.1528	
	Room fax	0.7783		0.059	
Leisure	Exercise room	-1.9494	16.03	1.2222	28.38
	Pool	0.5685		-0.0278	
	Exercise room and Pool	1.381		-1.1944	
Extras	Shoe shine	0.0513	17.66	0.2292	11.92
	Tape library	-1.5201		-0.6667	
	Fruit and cheese	1.2746		-0.0208	
	Newspaper	0.1942		0.4583	
Rest_Delivery	Yes	-0.9978	14.46	2.3542	12.25
	No	0.9978		-2.3542	

Properties of segments
Cluster_1 (Business)

■ Business amenities has higher importance

■ Room office (one bed, office desk) has higher utility score than other room types

■ Room fax has higher utility score(only 2nd to speaker phones)

■ Smaller pool and exercise room is preferred

■ Fruit and cheese and no restaurant delivery.

>> more independent, prefer small spaces, value their time, outgoing

| Level names	Cluster_1	
	Partworth utility	Importance
Small Suite	3.9747	28.07
Large Room	-8.7708	
Room Office	4.7961	
Internet access	-1.5789	23.77
Speaker phone	0.8006	
Room fax	0.7783	
Exercise room	-1.9494	16.03
Pool	0.5685	
Exercise room and Pool	1.381	
Shoe shine	0.0513	17.66
Tape library	-1.5201	
Fruit and cheese	1.2746	
Newspaper	0.1942	
Yes	-0.9978	14.46
No	0.9978	
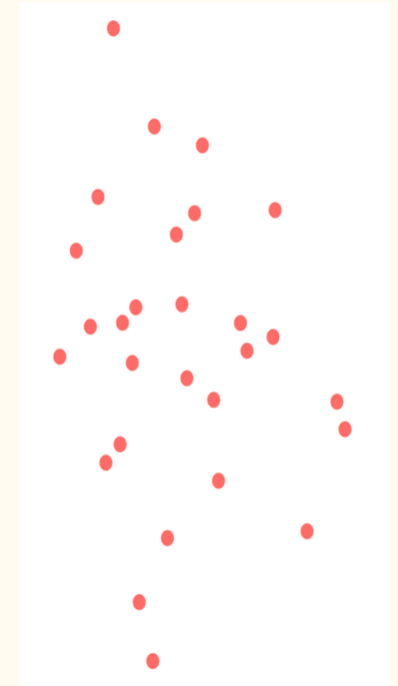
Properties of segments

Cluster_2 (Family/like to relax)

- The most important attribute is room type and prefer large rooms with double queen beds.

- Has higher importance on Leisure facilities over business amenities. Specifically well equipped exercise rooms. Pools with lap comes next.

- Daily news paper delivery

- Restaurant delivery via room service

>> value large spaces, leisure activities, news and easy access to different type of food.
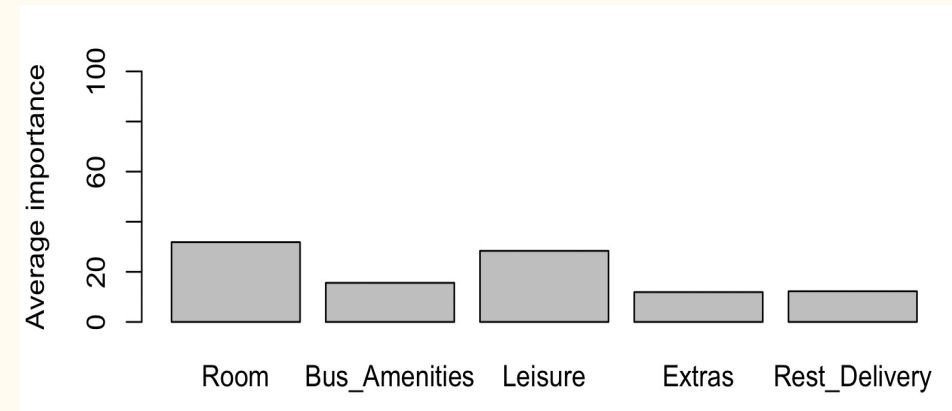
Level names	Cluster_2	
	Partworth utility	Importance
Small Suite	0.7257	31.85
Large Room	9.6528	
Room Office	-10.3785	
Internet access	-1.2118	15.61
Speaker phone	1.1528	
Room fax	0.059	
Exercise room	1.2222	28.38
Pool	-0.0278	
Exercise room and Pool	-1.1944	
Shoe shine	0.2292	11.92
Tape library	-0.6667	
Fruit and cheese	-0.0208	
Newspaper	0.4583	
Yes	2.3542	12.25
No	-2.3542	
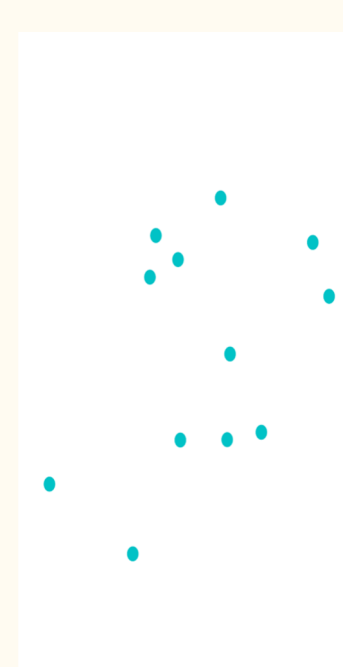
Forte Hotel's main goal is to target business people who comes from Europe to United States for business work and American business community.
 - Target Market should be Cluster_1 (Business)
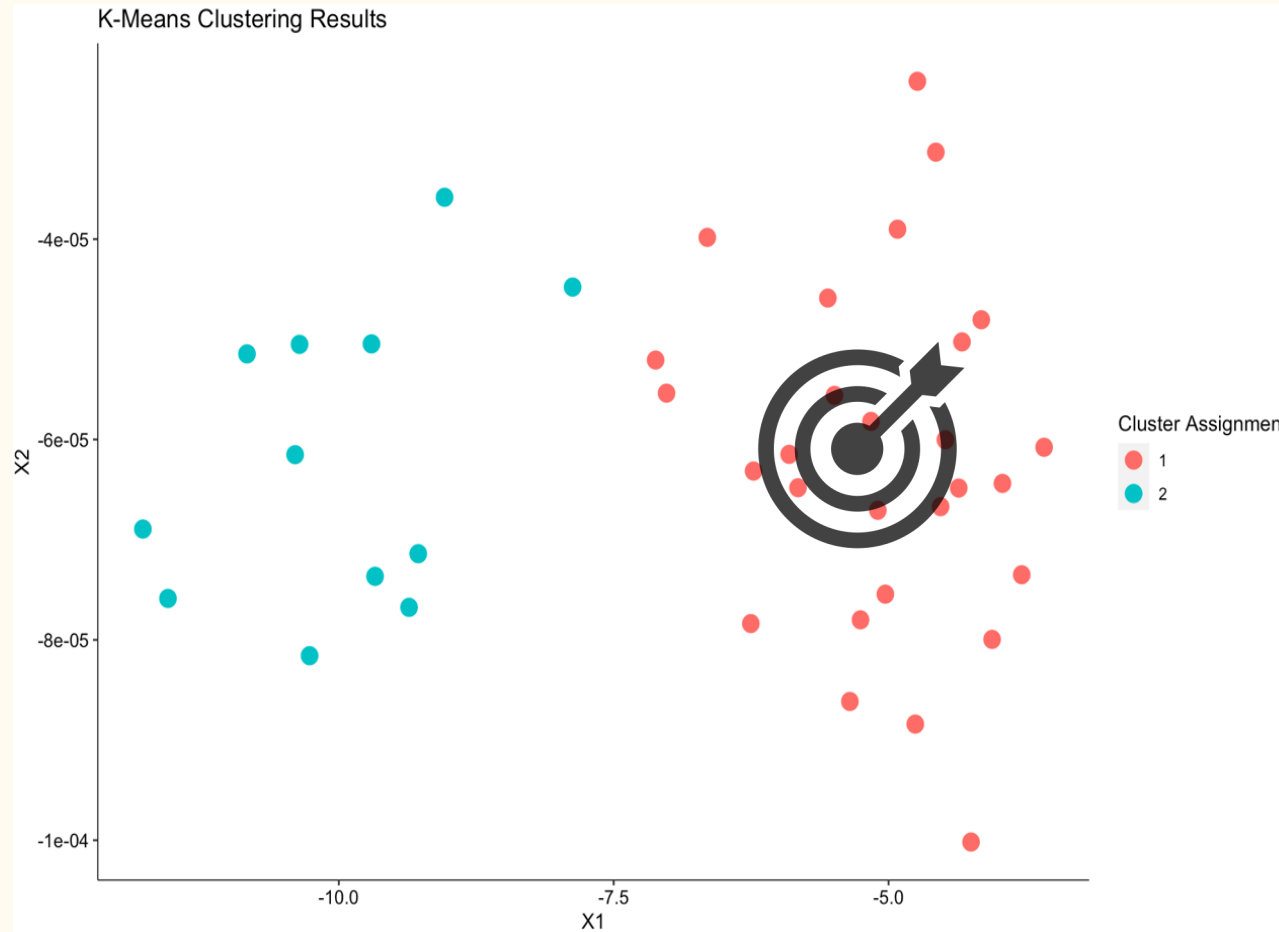
Summary

❑ The most attractive feature in the market - Room

❑ In general, small suite, speaker phones, small exercise room and small pool combo, complimentary fruit and cheese bowl, and restaurant delivery via room service are most attractive amenities.

❑ The most preferred bundle is Bundle 09 which includes
- *small suite,*
- *room fax,*
- *exercise room and pool,*
- *fruit and cheese*
- *no restaurant delivery*

❑ There are two segments in the market.
- *business class*
- *family oriented / like to relax*

Recommendations

❑ In case of launching the most preferred bundle (Bundle 09) to the market which consists of existing hotels, **Toftrees** and **Scanticon** would be the biggest competitors to look for.

❑ In case of launching the most preferred bundle (Bundle 09) to the market which consist of new hotel room bundles, Professional 02 bundle would be the greatest competitor.

❑ Forte Executive Inn should be targeting the cluster_1 (Business class) as their goal is attracting European business class who travels to United Sates and American business class.

THANK YOU!

References

❑ 1.https://www.slideshare.net/MinhaHwang/conjoint-analysis-part-33-market-simulator

❑ 2.https://www.r-bloggers.com/2018/12/conjoint-analysis-understand-your-customer-and-beat-the-competition/

❑ 3. https://faculty.idc.ac.il/jgoldenberg/pdf/Conjoint.pdf