

# *Courtyard by Marriott: Designing a Hotel Facility with Consumer-Based Marketing Models*

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Marriott used conjoint analysis to design a new hotel chain. The study provided specific guidelines for selecting target market segments, positioning services, and designing an improved facility in terms of physical layout and services. Based on these strategy and design recommendations, Marriott developed the *Courtyard by Marriott* concept, which it has successfully test marketed and subsequently introduced nationally. The effectiveness of the study and associated processes also changed Marriott's approach to new product development. Marriott has since developed additional lodging and related products successfully using similar procedures.

**I**nnovative new products and services have traditionally been created by the designers, architects, R&D engineers, or artists. Can marketing science be of help in this process? Marriott used conjoint analysis to design the new hotel chain, *Courtyard by Marriott*, illustrating the power and value of marketing science in designing such complex services as hotels.

Marriott hired outside consultants (the academic authors of this paper) to conduct a large-scale consumer study among business and nonbusiness travelers, aimed at establishing an "optimal" hotel design. The hotel features included seven sets (called "facets") of attributes (Table 1).

- (1) External factors — building shape, landscape design, pool type and location, hotel size;

<p><b>EXTERNAL FACTORS</b></p> <p>Building Shape  <u>L-shaped w/landscape</u>  <u>Outdoor courtyard</u></p> <p>Landscaping  Minimal  Moderate  Elaborate</p> <p>Pool type  No pool  <u>Rectangular shape</u>  Free form shape  Indoor/outdoor</p> <p>Pool location  In courtyard  Not in courtyard</p> <p>Corridor/View  Outside access/restricted view  <u>Enclosed access/unrestricted view/balcony or window</u></p> <p>Hotel size  <u>Small (125 rooms, 2 stories)</u>  Large (600 rooms, 12 stories)</p> <p><b>ROOMS</b></p> <p>Entertainment  Color TV  Color TV w/movies at \$5  Color TV w/30 channel cable  <u>Color TV w/HBO, movies, etc.</u>  Color TV w/free movies</p> <p>Entertainment/Rental  None  Rental Cassettes/in-room  Atari  Rental Cassettes/stereo cassette playing in room  Rental Movies/in-room  BetaMax</p> <p>Size  Small (standard)  <u>Slightly larger (1 foot)</u>  Much larger (2½ feet)  Small suite (2 rooms)  Large suite (2 rooms)</p> <p>Quality of Decor (in standard room)  Budget motel decor  Old Holiday Inn decor  New Holiday Inn decor  <u>New Hilton decor</u>  New Hyatt decor</p> <p>Heating and Cooling  Wall unit/full control  <u>Wall unit/soundproof/full control</u>  Central H or C (seasonal)  Central H or C/full control</p> <p>Size of Bath  Standard bath  <u>Slightly larger/sink separate</u>  Much larger bath w/ larger tub  Very large/tub for 2</p>	<p>Sink location  In bath only  <u>In separate area</u>  In bath and separate</p> <p>Bathroom Features  None  Shower Massage  Whirlpool (Jacuzzi)  Steam bath</p> <p>Amenities  Small bar soap  <u>Large soap/shampoo/shoeshine</u>  Large soap/bath gel/  shower cap/sewing kit  Above items + toothpaste, deodorant, mouthwash</p> <p><b>FOOD</b></p> <p>Restaurant in hotel  None (coffee shop next door)  <u>Restaurant/lounge combo, limited menu</u>  Coffee shop, full menu  Full-service restaurant, full menu  Coffee shop/full menu and good restaurant</p> <p>Restaurant nearby  None  Coffee shop  Fast food  Fast food or coffee shop and moderate restaurant  <u>Fast food or coffee shop and good restaurant</u></p> <p>Free continental  None  Continental included in room rate</p> <p>Room service  None  Phone-in order/guest to pick up  Room service, limited menu  Room service, full menu</p> <p>Store  <u>No food in store</u>  Snack items  Snacks, refrigerated items, wine, beer, liquor  Above items and gourmet food items</p> <p>Vending service  None  Soft drink machine only  Soft drink and snack machines  <u>Soft drink, snack, and sandwich machines</u>  Above and microwave available</p> <p>In-room kitchen facilities  None  Coffee maker only  Coffee maker and refrigerator  Cooking facilities in room</p> <p><b>LOUNGE</b></p> <p>Atmosphere  Quiet bar/lounge  Lively, popular bar/lounge</p>	<p>Type of people  Hotel guests and friends only  <u>Open to public — general appeal</u>  Open to public — many singles</p> <p>Lounge nearby  None  Lounge/bar nearby  Lounge/bar w/ entertainment nearby</p> <p><b>SERVICES</b></p> <p>Reservations  Call hotel directly  <u>800 reservation number</u></p> <p>Check-in  Standard  Pre-credit clearance  Machine in lobby</p> <p>Check-out  At front desk  Bill under door/leave key  Key to front desk/bill by mail  Machine in lobby</p> <p>Limo to airport  None  Yes</p> <p>Bellman  None  Yes</p> <p>Message service  Note at front desk  Light on phone  Light on phone and message under door</p> <p>Recorded message  Cleanliness/upkeep/management skill  Budget motor level  Holiday Inn level  <u>Nonconvention Hyatt level</u>  Convention Hyatt level  Fine hotel level</p> <p>Laundry/Valet  None  <u>Client drop off and pick up</u>  Self-service  Valet pick up and drop off</p> <p>Special Services (concierge)  None  Information on restaurants, theaters, etc.  Arrangements and reservations  Travel problem resolution</p> <p>Secretarial services  None  Xerox machine  Xerox machine and typist</p> <p>Car maintenance  None  Take car to service  Gas on premises/bill to room</p>	<p>Car rental, Airline reservations  None  Car rental facility  Airline reservations  Car rental and airline reservations</p> <p><b>LEISURE</b></p> <p>Sauna  None  Yes</p> <p>Whirlpool/jacuzzi  None  Outdoor  <u>Indoor</u></p> <p>Exercise room  None  <u>Basic facility w/weights</u>  Facility w/Nautilus equipment  Racquet ball courts  None  Yes</p> <p>Tennis courts  None  Yes</p> <p>Game room/Entertainment  None  Electric games/pinball  Electric games/pinball/ping pong  Above + movie theater, bowling</p> <p>Children's playroom/  playground  None  Playground only  Playroom only  Playground and playroom</p> <p>Pool extras  None  Pool w/slides  Pool w/slides and equipment  Pool w/slides, waterfall, equipment</p> <p><b>SECURITY</b></p> <p>Security guard  None  11 a.m. to 7 p.m.  <u>7 p.m. to 7 a.m.</u>  24 hours</p> <p>Smoke detector  None  <u>In rooms and throughout hotel</u></p> <p>Sprinkler system  None  Lobby and hallways only  <u>Lobby/hallways/rooms</u></p> <p>24-hour video camera  None  Parking/hallway/public areas</p> <p>Alarm button  None  Button in room, rings desk</p>
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Table 1: The 50 factors that describe hotel features and services and the associated (167) levels are categorized under seven facets. The underscored items were included in the final design of the hotel.

- (2) Rooms — room size and decor, type of heating and cooling, location and type of bathroom, amenities;
- (3) Food-related services — type and location of restaurant, room service, vending services and stores, in-room kitchen facilities;
- (4) Lounge facilities — location, atmosphere and type of people (clientele);
- (5) Services — including reservations, registration and check-out, limo to airport, bellman, message center, secretarial services, car rental and maintenance;
- (6) Facilities for leisure-time activities — sauna, exercise room, racquetball courts, tennis courts, game room, children's playroom and yard; and
- (7) Security factors — security guards, smoke detectors, 24-hour video camera, and so forth.

Overall, the study considered 50 attributes, each ranging from two to eight levels. (Indeed, to our knowledge, this is the most complex trade-off study ever conducted.)

We designed the study as a hybrid conjoint analysis task [Green 1984] and also included a price elasticity task using the ELASTICON model [Mahajan, Green, and Goldberg 1982] and a variety of other analyses (for example, multidimensional scaling and cluster analysis) related to consumers' demographic and psychological characteristics, attitudes, and usage of hotels.

The results of the study provided specific guidelines for selecting target market segments, positioning the hotel within the market, and designing an improved

facility in terms of physical layout and services. Using these strategy and design recommendations, Marriott developed the *Courtyard by Marriott* concept, test marketed it successfully, and subsequently introduced it nationally.

This application clearly demonstrates the value of consumer-based information to the design of products and services, even those as complex as a hotel chain aimed at specific target segments.

#### The Problem

In the early '80s, the Marriott Corporation was concerned that it was running out of good sites to place typical-design Marriott Hotels at a high enough rate to assure the firm's continued high rate of growth. It made a preliminary (and tentative) decision to develop a new hotel chain for the segment of travelers who were not satisfied with current hotel offerings. Two a priori segments were identified: business travelers (who travel at least six times a year and stay in mid-level hotels or motels) and pleasure travelers (who travel at least twice a year and stay in hotels or motels). Management faced a critical question: what type of hotel facilities and services should Marriott design and offer to attract these travelers away from the competitive facilities they were currently using.

To position and design a hotel that would meet management's profit and growth objectives, it was essential to (1) assure that the new hotel offered consumers good value for their money; (2) minimize cannibalization of Marriott's other hotel offerings; and (3) establish a market positioning that offered management a substantial competitive advantage.

We designed and implemented a large-scale consumer study to provide explicit answers to the following interrelated questions:

- Does sufficient demand exist for a new hotel concept aimed at the low business and pleasure segment to meet growth and financial return objectives?
- What is the best competitive positioning for the new hotels?
- Of the various hotel features and services listed in Table 1, which combination should be offered?
- What should be the pricing strategy for rooms in the new hotels?
- What should be the location strategy for the new hotels?

### The Approach

We conducted a consumer study for

Marriott management in the first quarter of 1982 (Figure 1). The study surveyed 263 midlevel business travelers, 83 high-end business travelers, and 255 nonbusiness travelers.

The concept-testing methodology we developed to help answer management's first three questions centered on a hybrid categorical conjoint analysis augmented by computer simulations and a number of related analyses.

Hybrid conjoint models [Green, Goldberg, and Montemayor 1981; Green, Goldberg, and Wiley 1982] adapt an old idea — self-explicated utility assessment [Wilkie and Pessemier 1973] — to conjoint analysis [Green and Rao 1971; Green and Wind 1973; Johnson 1974]. While a number of hybrid models have been proposed, each procedure entails the prior

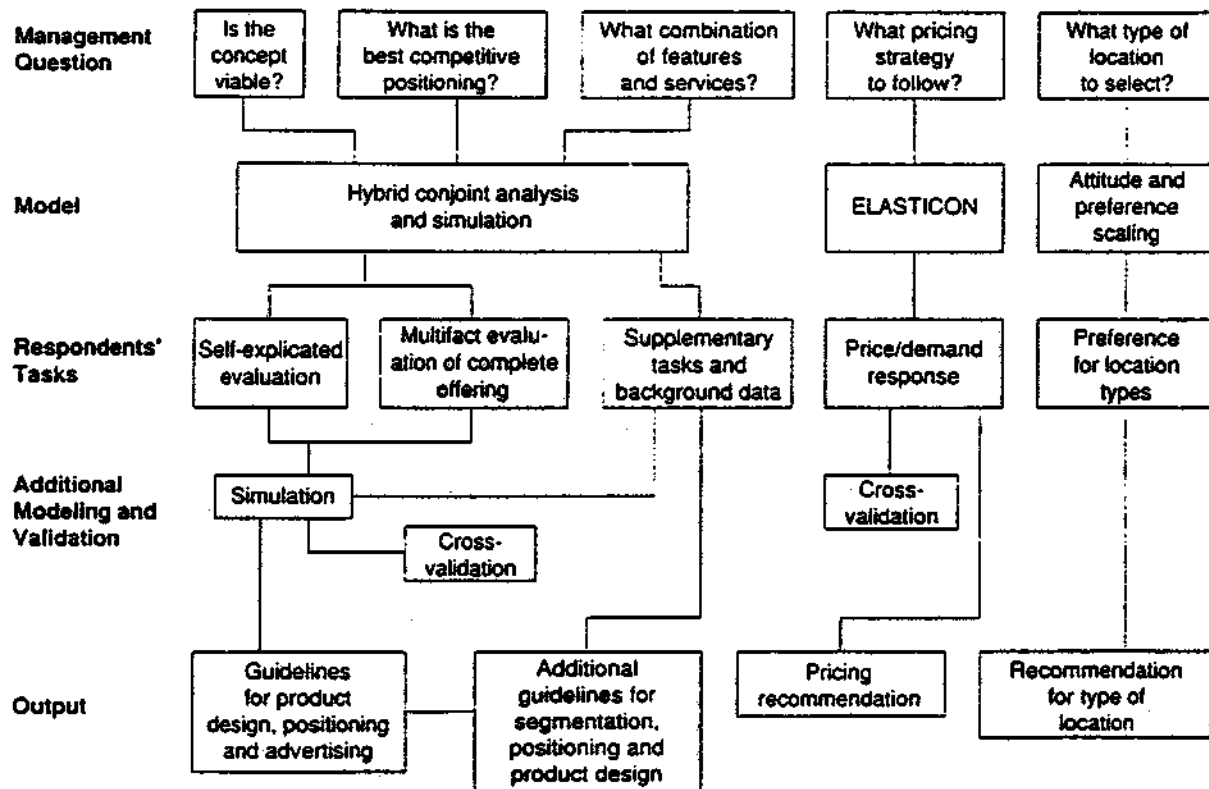


Figure 1: Overall study design and analysis outlines the management questions that guided the study, the models employed, the research, and the output.

consideration of some type of self-explicated utility task where respondents evaluate the levels of each attribute (one attribute at a time) on some type of desirability scale. This is followed by an evaluation of the attributes themselves on an importance scale and the collection of data on each respondent's evaluation of a limited set (usually eight or nine) of complete (all-attribute) stimulus profiles. These stimulus profiles are, in turn, drawn from a much larger master design (usually ranging between 64 and 256 profiles) that permits statistical estimation of all main effects and selected two-way interactions. Moreover, profiles are "balanced" (to prevent bias) within respondent by means of various blocking designs. The respondent evaluates each complete stimulus profile on some type of likelihood-of-purchase or intentions-to-buy scale. (We discuss the hybrid conjoint model briefly in the technical appendix.)

We analyzed the hybrid conjoint analysis data to produce individual utility functions. We input these, in turn, into a computer simulation that allowed management to assess any desired new concept formulation (for example, a specific combination of any of the attributes listed in Table 1) for the potential share of nights as well as the source of those nights (for example, the switching pattern from the other hotels). In addition, the simulation allowed management to identify the characteristics of each subsegment — those who switched to the new concept and those who did not.

To answer the pricing question, the study also focused on establishing the respondent's price elasticity among various

new hotel concepts and established hotels. We used the ELASTICON model and algorithm [Mahajan, Green, and Goldberg 1982] discussed in the technical appendix to determine elasticity.

To provide input to the location decision, we scaled each respondent's preferences for various locations. In addition, we used a number of other analytical approaches including the following:

- To establish and rank order the various segments' perception and preference for various hotel features and services, we employed multidimensional scaling (MDS) algorithms.
- To identify the key discriminating characteristics of the various segments (low-business vs. high-business vs. pleasure), we used multiple discriminant analysis (MDA).

### The Empirical Study

We conducted the study among 601 consumers, selecting four metropolitan areas — Atlanta, Dallas, San Francisco, and Chicago — on the basis of the results of an earlier psychological segmentation study. Within each market, we selected suburban areas and nearby small towns randomly. Within each subarea, we screened respondents (who were also selected randomly) by telephone to learn the number and type of trips they took, their incomes, and the type of accommodations they usually chose.

### Data Collection

We conducted a pretest prior to conducting our final survey. Both the pretest and the main interviews were administered in a central location setting, with supervisors available to explain any task a respondent did not immediately under-

stand. We designed both the pretest and the main surveys to maintain high respondent involvement in the various ranking and rating tasks. In addition, we paid the respondents a monetary incentive that varied by city and averaged \$35 per respondent. The respondents did not find the tasks too long or complex. Only three respondents refused to complete the tasks. Clear discrimination in the responses of all subjects was evident, indicating both understanding and lack of respondent burnout.

Overall, post-interview debriefing indicated high levels of interest in and completion of the tasks. We will discuss the various respondents' tasks in relation to the models and analytical methods employed.

#### Task 1a.

For the categorical conjoint analysis we first administered a questionnaire designed to question respondents on characteristics they prefer in hotels. This questionnaire is termed a "univariate self-explicated evaluation" because the respondent determines his or her preference for various hotel features and services based on a single rather than multiple comparison.

After explaining the task and the focus on the respondent's preferences for hotel amenities related to business trips (or nonbusiness trips), we gave each respondent seven cards, one at a time. Each card dealt with one of the seven facets (sets of attributes) of hotel facilities, including external factors and physical layout, and six other factors (the room itself, services, and so forth, see Table 1).

Figure 2 shows a card describing the "Rooms" facet. This set of features

("factors") includes nine attributes; for each factor three to five attributes are described, with the associated price included for each profile. For example, in the case of entertainment, the five levels range from color TV at no extra cost to color TV with a choice of three in-room movies for \$2.50. Marriott's cost-accounting department developed the specific price levels used.

The respondents were asked to think about their usual hotel stay (for business purposes or pleasure) and to check the triangle in each row that best described the hotel they currently used. Next, the respondents supplied one of three possible responses to each amenity-price combination:

- The combination is completely unacceptable;
- The combination is most preferred; and
- The combination is acceptable (by implication, that is, if they expressed a preference for each of the amenities or prices individually, we could infer their implied acceptance of the combination).

In addition, the respondent was also asked to rank the various factors within the facet on their relative importance. Similar cards were used for the remaining six facets. A total of 50 attributes, across the seven facets, were included. The total number of attribute levels exceeded 160; pictures were used, where appropriate, to describe the various attribute levels (for example, a hotel pool).

When the respondents had evaluated all seven facets, they were asked to add the total incremental costs of the features

ROOMS\*

Most Frequently Used Hotel Chain

\*"X" the TRIANGLE (  $\Delta$  ) in the block that comes closest to describing your current hotel (ONLY "X" ONE)  
 \*"X" the CIRCLE (  $\circ$  ) in the block(s) that you find to be completely unacceptable  
 (YOU MAY "X" NONE, ONE, OR MORE THAN ONE)  
 \*"X" the SQUARE (  $\square$  ) in the block that represents what you want and are willing to pay for (ONLY "X" ONE)

Features	Alternative Descriptions					Enter Price of Wanted Block
Entertainment	Color TV (.00) $\Delta$ $\circ$ $\square$	Color TV with movies which are 9 months ahead of HBO. \$5 each (.00) $\Delta$ $\circ$ $\square$	Color TV with 30 channel cable (.25) $\Delta$ $\circ$ $\square$	Color TV with HBO movie channel, sports news channel (.40) $\Delta$ $\circ$ $\square$	Color TV with free in-room movies (choice of 3) (2.50) $\Delta$ $\circ$ $\square$	
Entertainment/Rental	None (.00) $\Delta$ $\circ$ $\square$	Rental cassettes available for use with in-room Atan or Intellivision (.40)+ $\Delta$ $\circ$ $\square$	Rental cassettes available. In-room stereo cassette player (1.35)+ $\Delta$ $\circ$ $\square$	Rental movies, in-room video cassette player (BetaMax) (1.35)+ $\Delta$ $\circ$ $\square$		
Size & Furniture	Small—typical size motel/hotel room $\Delta$ $\circ$ $\square$	Somewhat larger—1 foot longer $\Delta$ $\circ$ $\square$	Much larger—2 1/2 feet longer $\Delta$ $\circ$ $\square$	Small suite—2 rooms $\Delta$ $\circ$ $\square$	Large suite—2 rooms $\Delta$ $\circ$ $\square$	
Quality of Decor (in standard room)	Similar to Days Inn and other budget motels $\Delta$ $\circ$ $\square$	Similar to older Holiday Inn, Ramada, Rodeway $\Delta$ $\circ$ $\square$	Similar to newer and better Holiday Inns $\Delta$ $\circ$ $\square$	Similar to newer and better Hilton and Marriott $\Delta$ $\circ$ $\square$	Similar to Hyatt Regency and Westin "Plaza" hotels $\Delta$ $\circ$ $\square$	
Heat/Cooling	Through-wall unit. Full control of heating & cooling year round $\Delta$ $\circ$ $\square$	Through-wall unit (soundproofed). Full control of heating & cooling year round $\Delta$ $\circ$ $\square$	Either central heating or cooling (not both), depending on season $\Delta$ $\circ$ $\square$	Full control of central heating & cooling year round $\Delta$ $\circ$ $\square$		
Bath size	Standard bathroom and tub/shower as in most hotels. Sink in bath only. $\Delta$ $\circ$ $\square$	Somewhat larger bath and standard tub/shower. Sink in separate area outside bathroom $\Delta$ $\circ$ $\square$	Much larger bathroom with large tub/shower $\Delta$ $\circ$ $\square$	Large bathroom with sunken tub for 2 $\Delta$ $\circ$ $\square$		
Sink location	Sink in bath only $\Delta$ $\circ$ $\square$	Sink in separate area outside bathroom $\Delta$ $\circ$ $\square$	Sink in bathroom and a sink outside bathroom $\Delta$ $\circ$ $\square$			
Bathroom features	None $\Delta$ $\circ$ $\square$	Shower massage $\Delta$ $\circ$ $\square$	Whirlpool (Jacuzzi) $\Delta$ $\circ$ $\square$	Steam bath $\Delta$ $\circ$ $\square$		
Amenities	Small bar of soap $\Delta$ $\circ$ $\square$	Large soap, shampoo packet, shoe shine mitt $\Delta$ $\circ$ $\square$	Large soap, bath gel, shower cap, sewing kit, shampoo, special soap $\Delta$ $\circ$ $\square$	Large soap, bath gel, shower cap, sewing kit, special soap, toothpaste, etc. $\Delta$ $\circ$ $\square$		
						TOTAL _____

↑  
Importance Ranking

\* This is the stimulus for the second facet. Each respondent received cards corresponding to all facets.

(Transfer Total Cost to Worksheet)

Figure 2: Stimulus cards of this type were used for all seven facets for the self-explicated conjoint analysis task.

and services they selected. If the total of the charges plus the base room price were higher than they were willing to pay on a regular business (or pleasure) trip,

they were asked to go back and select the enhancements they were willing to forego in order to arrive at an acceptable total room price.

ROOM PRICE PER NIGHT IS \$ 44.85

**BUILDING SIZE, BAR/LOUNGE**

Large (600 rooms) 12-story hotel with:

- Quiet bar/lounge
- Enclosed central corridors and elevators
- All rooms have very large windows

**LANDSCAPING/COURT**

Building forms a spacious outdoor courtyard

- View from rooms of moderately landscaped courtyard with:
  - many trees and shrubs
  - the swimming pool plus a fountain
  - terraced areas for sunning, sitting, eating

**FOOD**

Small moderately priced lounge and restaurant for hotel guests/friends

- Limited breakfast with juices, fruit, Danish, cereal, bacon and eggs
- Lunch—soup and sandwiches only
- Evening meal—salad, soup, sandwiches, six hot entrees including steak

**HOTEL/MOTEL ROOM QUALITY**

Quality of room furnishings, carpet, etc. is similar to:

- Hyatt Regencies
- Westin "Plaza" Hotels

**ROOM SIZE & FUNCTION**

Room 1 foot longer than typical hotel/motel room

- Space for comfortable sofa-bed and 2 chairs
- Large desk
- Coffee table
- Coffee maker and small refrigerator

**SERVICE STANDARDS**

Full service including:

- Rapid check in/check out systems
- Reliable message service
- Valet (laundry pick up/deliver)
- Bellman
- Someone (concierge) arranges reservations, tickets, and generally at no cost
- Cleanliness, upkeep, management similar to:
  - Hyatts
  - Marriotts

**LEISURE**

- Combination indoor-outdoor pool
- Enclosed whirlpool (Jacuzzi)
- Well-equipped playroom/playground for kids

**SECURITY**

- Night guard on duty 7 p.m. to 7 a.m.
- Fire/water sprinklers throughout hotel

"X" the ONE box below which best describes how likely you are to stay in this hotel/motel at this price:

Would stay there almost all the time <input type="checkbox"/>	Would stay there on a regular basis <input type="checkbox"/>	Would stay there now and then <input type="checkbox"/>	Would rarely stay there <input type="checkbox"/>	Would not stay there <input type="checkbox"/>
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Figure 3: This full profile description of a hotel offering is one of the 50 cards developed by a fractional factorial design of the seven facets each at the five levels (developed by the Marriott's development team). Each respondent received five cards following a blocking design.



### Task 1b.

In the second phase of the categorical conjoint analysis we obtained a multifaceted evaluation of "complete" hotel offerings. In this phase, each respondent was shown, one at a time, five cards, each containing a full-profile description of a "complete" hotel offering (Figure 3). Each set of five cards was drawn from a possible 50 cards and was balanced within subject. Using factorial design (aided by computer analysis), we arranged for respondents to receive various combinations of the 50 profiles. This approach provided the respondents with choices that made sense to them, provided the researchers with sufficient information to be statistically significant

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### We gave each respondent seven cards, one at a time.

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and unbiased, and provided Marriott with the practical knowledge necessary to design a new hotel.

In this case we treated each of the seven facets as an experimental factor with five levels each. Thus, we obtained a large range of combinations: five to the seventh power (five levels, seven facets). What this means is that we used statistical computing and a complex experimental design (the  $5^7$  full-factorial design) called a fractional orthogonal main effects plan. This experimental design, although complicated to explain, can help management determine what qualities the respondents preferred in a hotel, given the trade-offs they have to make for comfort versus price.

Within each facet, Marriott personnel constructed the five levels so as to "cover" the range of interest. As might be expected, attribute levels tended to be correlated within each facet so that premium priced amenities often clustered together. Despite these clusters of answers at the attribute level, which might bias a study, the orthogonality of the master design across facets was respected. For each of the five hotel descriptions that each respondent received, he or she was asked to indicate the likelihood of staying there.

### Task 2. The ELASTICON Model

We evaluated each of the hotels likely to compete with the new hotel (for example, LaQuinta, Marriott, newer and older Holiday Inns) and the tested hotel concepts under various prices. We first described the hotel concepts in terms of price, external factors, rooms, food and beverage services, entertainment, recreation and other services and security. Each respondent received five cards. Each card listed four existing hotels and two new hotel concepts, each at a specific price. We based the specific prices on an experimental design involving 32 combinations. The respondents were asked to allocate 100 points among the hotel-price combination based on how likely they would be to stay at each hotel at the given price.

### Task 3. Location Analysis

To provide guidance in positioning the hotel location competitively, we asked respondents to allocate 100 points among a set of locations based on their importance in selecting a hotel. We defined the locations in terms of closeness to business, shopping, sightseeing, night life, theaters, airport, major highways, and so forth.

#### TASK 4.

In addition to these major tasks, we asked the respondents for demographic information and for information on the type of overnight hotel accommodations used for business and nonbusiness stays, the frequency and length of stay, the price usually paid, and so forth.

To provide further guidelines for the room design, we conducted a secondary conjoint analysis on seven additional design factors, including room size, quality of decor, type of heating and cooling unit, bath size, bathroom features, and the amenities and type of entertainment available in the room. As in the preceding full-profile task, we gave each respondent only a small number of cards — four in this case — for evaluation.

To provide additional information for the design of the hotel, we asked the respondents to rank the importance of several features, including an alarm clock, carpeted bathroom, baby-sitting service, hot tub, king-sized bed, plants in the room, remote TV controls, windows that open, X-rated movies, and AM/FM radio.

To help Marriott management select the hotel name, we asked respondents to indicate how much they liked each of 11 names, and following this to rank the names that best fit the hotel concept. *Courtyard by Marriott* was one of the 11 names.

To help position the hotel's image, we gave the respondents a number of supplementary tasks. We asked them to evaluate hypothetical hotels on the degree to which they had each of several desired characteristics and the degree to which they would compare favorably or unfavor-

ably on these attributes to a Holiday Inn. The stimulus set included such characteristics as "a place kids really like," "gives a complete break from usual routine," "gives safe and secure feeling," "has stimulating/exciting atmosphere," "is good for people who do not want to be hassled," "is a good place for people on a budget," "provides a comfortable room for when you are alone," and "has charm, warmth" and so forth.

In addition, we gave respondents a

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"a special little hotel at a very comfortable price"

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number of descriptions of different types of hotels derived from the segmentation study. These descriptions included such positionings as "a busy, efficient, modern hotel," "a good, no-frills, basic hotel," "an informal, quiet, relaxing hotel with charm and personality," "a casual feeling in a hotel with understated elegance," "and an exciting, action-oriented hotel with spectacular, modern architecture."

#### The Analysis

The core of our analysis centered on computing consumer utility functions for the hotel amenity-price evaluation. Using data collected in the two phases described for the categorical conjoint analysis, we performed the following steps:

- For each of the seven facets, we employed a categorical conjoint analysis for the facet's response data.
- We computed each respondent's self-explicated utility (with individualized importance weights) to obtain a set of predictor variables.

- We then computed parameters of the hybrid conjoint model for each cluster of respondents.
- We found the residuals from this step and regressed them on the total room price (the five cards shown to the respondent in Task 1b). We then determined if including this variable accounted for significant variance in the residuals.

These steps constituted the main thrust of the analysis and generated the data used in the computer choice simulation described in the appendix. The simulation was designed to evaluate the market attractiveness of various bundles of features and services. It allowed the design team to specify alternative design concepts and to obtain, for each specific bundle of services, the estimated share of choice for that "concept," vis-a-vis its intended competitors.

We augmented these various analyses to consider such methodological questions as: How accurate are the results at the individual level? How sensitive are the predictions to changes in facet importance weights? What is the effect of the blocking variable (that is, the particular five profiles out of 50 evaluated by the respondent in the first place)?

We conducted other analyses to answer management's questions:

- to provide further guidance in selecting hotel features, we ran a conjoint analysis on the additional room features evaluated in Task 4 and ran an MDS on the 16 secondary features examined in Task 4;
- to establish price elasticity, in addition to performing conjoint analysis on

Tasks 1a and b, we analyzed the data from Task 2 using the ELASTICON model and methodology;

- to determine the profile of the segments, we conducted a series of multiple discriminant analyses; and
- to help name, position and locate the hotel, we conducted cross-tabulations and preference mapping for the data from the relevant tasks.

## Results

The study clearly suggested that some business and pleasure travelers were dissatisfied with current hotel offerings. Some hotels cost too much and offer features not valued by the traveler while others that cost less offer too few of the desirable features. Both types of hotels also tend to lack the personalization of features that travelers seek. Thus, a new hotel concept tuned to travelers' needs at an acceptable price seemed to be the most viable product for Marriott to consider.

The respondents' dissatisfaction with hotels that cost too much for the value given and with others that offer too little, combined with the set of hotel amenities they selected as most desirable and the level of price sensitivity, all suggested the chosen positioning of "a special little hotel at a very comfortable price." This market positioning was further reinforced by the pleasure and nonbusiness travelers' selection of the following description as the most preferred hotel — "an informal, quiet, relaxing hotel or motel with charm and personality." The respondents' clear specification of desired product attributes and price defined the competitive positioning of *Courtyard by Marriott* vis-a-vis

Attribute	Levels	Description	Part Worths
Hotel Size	1	Small (125 rooms) 2-story hotel (.00)*	1.06
	2	12-story (600 rooms) with large lobby, meeting rooms, etc. (7.15)	0.00
Corridor/View	1	Outside stairs and walkways to all rooms. Restricted view. People walking outside window. (.00)	0.00
	2	Enclosed central corridors and stairs. Unrestricted view. Rooms have balcony or large window. (.65)	1.85
Pool Location	1	Not in courtyard (.00)	0.00
	2	In courtyard (.00)	1.37
Pool Type	1	No pool (.00)	0.61
	2	Rectangular pool (.45)	1.25
	3	Freeform pool (.50)	0.29
	4	Indoor/outdoor pool (.85)	0.00
Landscaping	1	Minimal landscaping (.00)	0.81
	2	Moderate landscaping (.10)	0.97
	3	Elaborate landscaping (.50)	0.00
Building Shape	1	"L" shape building with modest landscaping (.00)	0.00
	2	Building forms an outdoor landscaped courtyard for sitting, eating, sunning, etc. (.45)	0.37

\*Figure in parentheses after each description = price premium.

Table 2: Part worths are shown for attribute levels within the external factors/facilities facet. Similar output was developed for the other facets for each target segment (for example, low-end business travelers) and the total market.

other Marriott hotels (providing important guidelines to a product line strategy) and vis-a-vis the industry's other hotels aiming at the same target segment. This selected positioning was found to be superior to the original positioning management considered, namely, that of a small Marriott hotel.

The study provided extremely detailed guidelines for the selection of close to 200 features and services. Table 2 is an example of the output for various external features or facilities. It suggests how powerful the study was in directing the design of the hotel. The attributes selected for the hotel are those that are numbered in bold type — the ones with

the highest utility for the target segments. In Table 1, the underlined items are the levels of the various factors selected for the hotel. Some of the specific attributes Marriott selected for inclusion were amenities such as shampoo and medium soap; in-room kitchen facilities (for regular rooms — either coffee makers or coffee makers and refrigerators); and "limo" to airport (a van at airport location). For the most part, indoor whirlpools or jacuzzis were installed except in Arizona and California, where some outdoor ones were installed. Marriott postponed installation of complete exercise rooms based on their management expertise (weight rooms were included).

Similar output and patterns of implementation were found for the other six sets of attributes. We presented the results to management in cross-tabulation form for each of the 50 features. The computer simulation provided additional and most significant insight into the value of various features and services. The simulation output offered the design team and management a clear idea of

- (1) The likely share (of nights) any hotel concept (presented as a specific combination of features and services from those listed in Table 1) would get by any target segment(s).
- (2) The source of business — the hotels from which the new hotel is most likely to draw business, including the likelihood of cannibalization of the Marriott.
- (3) The characteristics of the specific segment attracted to the specific configuration of attributes and services.

The final design — the underlined items in Table 1 — was quite different from the original design idea of a small Marriott, but it reflected the highest expected share from the target business and pleasure segments.

The results of the ELASTICON tasks and analysis included

- (1) the expected share for each of the concepts tested by each price versus their current competition,
- (2) the likely source of business for the concept, and
- (3) the self-elasticity and cross-elasticity of demand for the concept. We presented this most critical information for each segment in a table similar to Table 3. In addition, the price/demand

#### Reference Conditions:

La Quinta at \$30/night	
Older Holiday at \$35/night	Share of Nights
Newer Holiday at \$48/night	18.0%
Newer Marriott at \$66/night	
Hampton at \$42/night	

#### Alternative Price Conditions:

La Quinta at \$26/night
Older Holiday at \$31/night
New Holiday at \$42/night
Newer Marriott at \$60/night
Hampton at \$38/\$46/\$50/night

#### Self Price/Demand Relationships

- If Hampton is priced at \$38, add 7.8 points to Hampton's share.
- If Hampton is priced at \$46, subtract 5.1 points from Hampton's share.
- If Hampton is priced at \$50, subtract 12.3 points from Hampton's share.

#### Other Price/Demand Relationships

- If newer Holiday is priced at \$42, subtract 2.6 points from Hampton's share.
- If older Holiday is priced at \$31, subtract 1.3 points from Hampton's share.

**Table 3: Hampton ELASTICON results for low-end business segment presents an illustrative result of the ELASTICON tasks and analysis.**

relationship for each segment was also presented graphically.

The analysis of the respondents' answers to questions concerning the desired location of the hotel in terms of its proximity to business, shopping, theaters, airports, and so forth, greatly aided management in deciding on location. In addition, because target segments had a utility for a restaurant, one criterion for a site became the availability of a nearby restaurant.

#### Implementation

Development team members from several corporate departments were involved in the design of the study and provided expertise in the direct translation of the research results into final product design.

The resulting hotel follows almost to the letter the recommendations of the study. Every one of the features and services offered were among the highest valued by the consumer.

#### Validation

We implemented internal cross-validation of the conjoint analysis by using a leave-one-out procedure. We predicted each individual's actual first choice (among the five full profiles evaluated) from model parameters computed across the rest of the sample. Each person's data were held out and predicted, one respondent at a time. Predictions covered not only first choice but the ranking of each respondent's five profiles.

The leave-one-out procedure indicated that approximately 40 percent of first choices were predicted (versus 20 percent by chance). Given the complexity of the profiles (and respondent heterogeneity), this performance, while not outstanding, was statistically significant. (Predictions of the market share level were much higher: mean absolute deviations of four to five share points were obtained from a bootstrap resampling procedure.)

We also used a leave-one-out procedure for the ELASTICON model with even better results. In this case we predicted market share by using the model demand from the remaining conditions; the mean absolute difference in share of market was quite small (0.031).

The most effective validation of the study results is the success of the *Courtyard by Marriott*. Currently, *Courtyard by Marriott* has 175 hotels either open, under construction, or under contract; 111 were opened by the end of 1988. Marriott

committed over \$450 million a year to national expansion. Figure 4 shows the expansion pattern of the new chain, which is the fastest growing, moderately priced hotel chain in the country. The actual market share of *Courtyard by Marriott* was within four percentage points of the share predicted by the conjoint simulation.

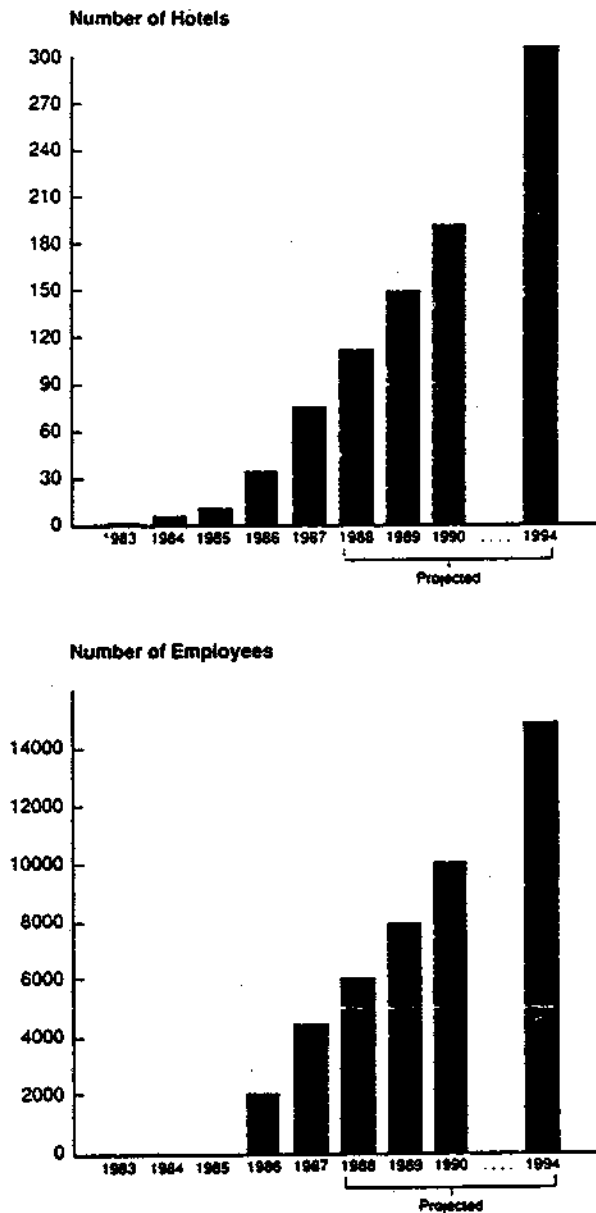


Figure 4: The Courtyard chain has grown quickly between 1983 and 1987 and further growth is projected for the future.

The validity of the study's conclusions was also evident when we analyzed the results of the guest-tracking studies. These studies revealed that the features and services offered are very important to the consumer and are perceived as better at *Courtyard by Marriott* than at its competition.

#### **Impact**

The study has had a major impact on the profitability and growth of Marriott Corporation. The *Courtyard by Marriott* chain is a success. The in-depth hotel experience of Marriott executives led them to expect that a smaller version of a typical Marriott hotel was needed. Surprisingly, the study resulted in a new product that was markedly different from the normal Marriott with a clear appeal to a distinct target market segment. In fact, the important differences identified for the *Courtyard by Marriott* product led Marriott to create an operating division separate from Marriott hotels.

#### **Direct Benefits**

The study gave Marriott executives the confidence to expend the large amount of personnel time and funds necessary to develop this new product from the ground up. The close tie between the study results and the executed product demonstrates the importance of the study in guiding development.

Since the results focused not only on what the travelers wanted, but also identified what they did not want to pay for, the design team was able to meet the specified price while retaining the features most desired by the target market. Features often provided based on traditional hotel management beliefs were not

retained, for example, an "action" lounge, a more upscale restaurant and room service, and more meeting space. This focus on guest needs allowed more funds to be spent on better executions of highly desired guest features. The resulting design filled a gap in the market with a product that represented the best balance between price and desired product and service features.

The addition of *Courtyard by Marriott* to the Marriott hotel product line allowed the Marriott Corporation to continue rapid hotel expansion and profitability by placing hotels in locations where a typical Marriott hotel could not be profitably justified: (1) in lower demand areas and smaller sites in major markets; and (2) in smaller markets.

One important additional benefit is the positive psychological impact the study had on Marriott's personnel, who know that the hotel is based on consumer perceptions and preferences and is therefore designed to serve consumers better and offer them the best value.

An important by-product of the study was the effective incorporation of the study's results in Marriott's advertising and promotion programs.

#### **Indirect Benefits**

The project fostered an orientation of employee attitudes toward the identification and satisfaction of customer preferences. This impact ranged all the way from entry level training programs to top management.

The success of the *Courtyard by Marriott* study led to the development of additional customer-driven products (Fairfield Inn and Marriott Suites), all using the

methodology and models similar to those employed in the original study.

The occupancy rate of the chain is higher than the industry average, and the consumer satisfaction with the hotel and its services is very high.

#### Financial Impact

The *Courtyard by Marriott* chain has been a success, growing from three test hotels in 1983 to 90 hotels in 1987 (with sales exceeding \$200 million). The chain is expected to grow to 300 hotels by 1994 (with sales exceeding \$1 billion). *Courtyard by Marriott* thus contributes significantly to Marriott's overall growth goals and related stock values. It has already created 3,000 new jobs. By 1994, that figure is expected to reach 14,000.

The impact of *Courtyard by Marriott* on the hotel industry has also been substantial. The targeted design and positioning of *Courtyard by Marriott* has filled an identified gap or niche in the market. The success of this effort has caused a restructuring of the midprice level of the lodging industry.

- (1) Older hotels in the *Courtyard by Marriott* price range found themselves losing market share. They generally decided to upgrade their properties, to reduce prices in order to compete, or to sell out.
- (2) Relatively new and often more upscale hotels located near *Courtyard by Marriott* hotels found themselves losing market share and decided to refurbish their hotels ahead of schedule, to reduce rates on competitive business (weekday transient guests and weekends), or to add popular features available at *Courtyard by Marriott*.

- (3) At least five new *Courtyard by Marriott* clone chains have been initiated by other hotel groups. They all offer a high-end hotel room at a midlevel price. In some cases, they add a feature for differentiation, but the basic consumer appeal is the same.

In addition to the industry impact and specific benefits to Marriott, the approach demonstrates to marketing management and the marketing science community that

- Products and services can, and should, be developed using targeted consumer perception, preference, and attitudinal inputs;
- Complex and large products, such as hotels (with close to 200 attribute levels), can be studied effectively using creative conjoint analysis designs; and
- Categorical hybrid conjoint analysis models can be used in commercial applications.

Many products and services — cars, boats, electrical appliances, single homes, condominiums, stereo and video equipment, computer terminals, copy machines, word processors, financial services — are often sold as basic units with various add-ons that are optional at extra cost. The methods described here (or some variation of them) can be applicable to this wide class of problems.

#### TECHNICAL APPENDIX

While a variety of marketing research tools were employed in the *Courtyard by Marriott* study, the primary set of techniques was drawn from conjoint analysis. Conjoint analysis was introduced to marketing research in the early 1970s [Green and Rao 1971]. Since that time, applications to industry and government



problems, both in the US and abroad, have been extensive and varied.

Conjoint analysis is a survey-based technique for measuring consumers' trade-offs among product and service attributes [Green and Wind 1973]. In traditional conjoint analysis, respondents are shown profiles of product or service offerings. Each profile (see Figure 3) is made up of a set of attribute levels. The specific combination of attribute levels is drawn from a balanced experimental design, often referred to as an orthogonal array. Table 1 shows the extensive set of factors and levels used in the *Courtyard by Marriott* study.

Each respondent receives a set of profiles and evaluates each profile's "worth" to him or her on some type of preference or likelihood-of-purchase scale. In our study, we were concerned with the likelihood that a respondent would stay at a specified hotel or motel (see Figure 3). In traditional conjoint studies involving seven or fewer product/service attributes, conventional dummy variable regression (or perhaps isotonic regression in which the response variable, likelihood of staying, is expressed only on an ordinal scale) is used to find parameter values. These parameter values are called part worths; one such part worth is obtained for each attribute level, for each respondent.

The set of part worths derived for a particular respondent represents the building blocks for predicting how the respondent would value some *new* combination of attribute levels. The part worths may be simple (so-called main effects) parameters, or they may include various sets of interactions. Often the researcher employs small holdout samples to determine the accuracy of the predictions. (However, in larger-scale studies, the logical number of combinations and predictions may be enormous, amounting to hundreds of thousands or possibly millions of possible products or services.)

In virtually all conjoint studies, a computer choice simulator is employed to forecast shares of choice as new product/service profiles are introduced to the market. The part worths are used in various ways to estimate shares of choice for competing market offerings. Recently, choice simulators have been augmented by the development of optimal product and product-line design models that systematically explore the product or service "space" to find attribute combinations that maximize share or profits, conditional on the characteristics of competitive offerings. Another recent development is the appearance of commercial software packages that include modules for preparing experimental designs, product profile presentation by computer, part worth estimation, and choice simulators, all integrated for personal computer implementation.

In the *Courtyard by Marriott* study, we employed two fairly recent innovations in conjoint analysis — hybrid models for data collection, for use when the number of product or service attributes is extensive, and ELASTICON, a version of conjoint analysis that is particularly well suited for measuring price/demand relationships. These developments (and a short description of how choice simulators were used in our study) follow. (Material for the technical appendix is drawn from Goldberg, Green, and Wind [1984] and Mahajan, Green, and Goldberg [1982].)

### Hybrid Conjoint Models

Hybrid conjoint models have been developed recently to cope with a practical problem in applied conjoint analysis, namely, the need to streamline the data collection task while still preserving individual differences in utility functions [Green, Goldberg, and Montemayor 1981]. The name *hybrid* is used to denote the fact that the technique incorporates both

compositional and decompositional procedures to obtain utility functions. While a number of hybrid models have been proposed, each procedure entails the consideration of some type of self-explicated utility where respondents evaluate the levels of each attribute (one attribute at a time) on some type of desirability scale (phase 1); this is followed by an evaluation of the attributes themselves on an importance scale (phase 2). These two phases together represent the compositional part of the model.

For the *Courtyard by Marriott* study, Figure 2 shows an illustration of the self-explicated section. Each attribute (for example, entertainment) and its levels are evaluated, one at a time, in terms of their acceptability. In addition, each attribute (that is, feature) is evaluated with respect to its importance in the facet.

A respondent's self-explicated utility for the  $h^{\text{th}}$  stimulus profile is usually assumed to be given by a simple additive model,

$$U^h = \sum_{j=1}^I w_j u_{ij}^h \quad (1)$$

where

$U^h$  = the respondent's total utility for alternative  $h$ ,

$w_j$  = the respondent's self-explicated importance weight of attribute  $j$ , and

$u_{ij}^h$  denotes the fact that alternative  $h$  has a desirability score of  $u$  on level  $i$ , of attribute  $j$ , and  $J$  is the number of attributes. (For ease of presentation the respondent index is suppressed.)

The next phase of data collection (the decompositional part) involves presenting each respondent with a limited set (usually eight or nine) of complete (all-attribute) stimulus profiles (phase 3). These stimulus profiles, in turn, are drawn from a much larger master design (usually ranging between 64 and 256 profiles) that permits orthogonal estimation of all main

effects and selected two-way interactions. Moreover, profiles can be "balanced" within respondent by means of various blocking designs. The respondent then evaluates each complete stimulus profile on some type of likelihood-of-purchase or intentions-to-buy scale. Call each of these responses  $Y^h$  for the stimulus profile  $h$ .

Figure 3 shows a sample stimulus profile drawn from the *Courtyard by Marriott* study in which the attribute descriptions are composed from the basic attribute level design of Table 1. The respondent is asked for an overall response: to rate the profile in terms of his or her likelihood of staying there. From the self-explicated part of the hybrid model, the researcher already has parameter estimates of the attribute levels' part worths when attributes are considered one at a time. The next step is to integrate the full profile responses with the self-explicative estimates.

The self-explicated task of phase 1 provides a matrix of utility functions, of order  $N$  by  $\sum I_j$ , for the  $N$  respondents, where  $I_j$  is the number of levels for attribute  $j$ . This matrix is row centered or standardized to zero mean and unit standard deviation or both. That is, each respondent's specific set of  $w_j u_{ij}^h$ 's in equation (1) — there are  $\sum I_j$  of these for each respondent — are often expressed as deviations from his or her mean. Respondents are then clustered on the basis of similarities in their self-explicated utility functions. Assume that  $K$  clusters are found.

The hybrid model's parameters are then separately estimated for each cluster by means of OLS (ordinary least squares) regression. The full hybrid model is defined as follows:

$$Y^h = a + b U^h + \sum_{i=1}^I v_{ij} + \sum_{i < j} t_{ij} \quad (2)$$

where stimulus profile  $h$  has level  $i$ , for

attribute  $j$ .  $u$  is separately computed for each respondent and each profile via equation (1):  $a$  is an intercept term,  $b$  is a regression slope parameter representing the contribution of the self-explicated utility to  $Y$ , and the  $v$ 's and  $t$ 's are also regression parameters, estimated at the cluster level. The  $v$ 's denote main effects while the  $t$ 's denote selected two-way interactions, where the arguments are attribute-level descriptions. Hence, each respondent's utility function consists of two sets of parameters — one set measured at the individual level and one set measured at the subgroup (or cluster) level.

The last step, then, is to integrate the various sets of parameter values into a vector of part worths (including interactions, if necessary), one vector for each respondent. Thus, in terms of Table 1, we obtain an individual part worth for each respondent for each attribute level shown in that table. To illustrate, Table 2 shows a set of averaged part worths for only one facet of the design: external factors.

#### Categorical Hybrid Conjoint Analysis

In the *Courtyard by Marriott* study, we employed a form of conjoint analysis called categorical conjoint analysis for estimating the part worths of the individual attribute acceptabilities, prior to applying equations (1) and (2). Full details of the method are available in Goldberg, Green, and Wind [1984] and Green and Goldberg [1981].

#### The ELASTICON Model

An important case of conjoint modeling entails the trade-off of price versus non-price attributes in a competitive context. The ELASTICON model is a type of conjoint analysis approach in which the respondent sees not one supplier's profile of attribute levels but a composite profile that explicitly shows each competitive offering and its associated price. For example, in the *Courtyard by Marriott* study, the profile may consist of five alternative

motels or hotels: La Quinta, older Holiday Inns, newer Holiday Inns, and Hampton Inns, each shown at different prices. The respondent's task is to indicate, under the stated price conditions, what share of his or her choices would go to each alternative.

This type of design and subject's response is quite different from the usual presentation in which the respondent sees alternative profiles of only a single supplier or product offering. It is also different in that the conjoint part worths now include, as arguments, prices of competitors as well as one's own price levels. First we will describe how price has been conventionally dealt with in conjoint studies. We will then present this alternative formulation and analysis (referred to as the ELASTICON model).

In most applications of conjoint analysis, price is almost always included as an additional attribute in describing brand or supplier profiles. In the simplest case in which only two attributes vary (for example, brand name and price), the respondent may be given all combinations of each brand crossed with each price level and asked to rank or rate the combinations according to preference. These data are then analyzed [Green and Srinivasan 1978] to yield a set of part worths for brand and a set for price.

In the case of three or more attributes (two of which are brand and price), the procedure is similar except that fractional factorial designs are usually employed. In either case, it is often assumed that each price can appear with each brand name (or any other attribute combination) and that all brands are subject to identical variation in permissible price levels. Moreover, it is usually assumed that the derived part worths for the price attribute are independent of the specific brand with which any price level is associated.

#### An Alternative Formulation

As an alternative formulation of the

conjoint analysis problem, consider an experimental design in which each price level is affixed to a specific brand and the respondent sees all brands, appropriately priced, simultaneously (see Mahajan, Green, and Goldberg [1982]). In this case, the respondent is asked to allocate 100 points across the various alternatives so as to reflect the likelihood of choosing each brand-price combination. In this procedure, if there are  $l_j$  price levels for the  $j^{\text{th}}$  brand ( $j = 1, 2, \dots, J$ ), the full factorial design consists of  $l_1 \times l_2 \times \dots \times l_J$  combinations. Hence, if there are four brands each appearing at five price levels, the full factorial consists of  $5^4 = 625$  combinations, not  $5 \times 4 = 20$  combinations, as assumed in the conventional trade-off model.

Fractional factorials can also be used in the alternative formulation; each set of permissible price levels can be idiosyncratic to each brand and the number of price levels can vary brand by brand. Furthermore, other attribute levels that are idiosyncratic to each brand (for example, miles per gallon, length of service warranty) also can be added to the profiles.

In the conjoint model formulation, we can fit separate functions for estimating the probability of choosing brand  $j$  from the set of  $J$  brands as long as two restrictions, inherent in the respondent task, are observed:

- (1) Each estimated probability for choosing some  $j^{\text{th}}$  brand should range from zero to one.
- (2) The sum of the choice probabilities across all  $J$  brands (including some other-brand category, if desired) should equal unity.

Satisfaction of the first restriction can be accomplished by use of a logit transformation. To illustrate, consider  $P_{i_1 i_2 \dots i_J}$  the probability of choosing brand 1, given the specific price levels  $i_1, i_2, \dots, i_J$  of all  $J$  brands. The logit function [Berkson 1969] is defined as the natural logarithm of the

odds favoring the choice of brand 1 to its nonchoice:

$$L_{1(i_1 i_2 \dots i_J)} = \ln \left[ \frac{P_{i_1 i_2 \dots i_J}}{1 - P_{i_1 i_2 \dots i_J}} \right]. \quad (3)$$

Note that the logit  $L_{1(i_1 i_2 \dots i_J)}$  increases from  $-\infty$  to  $\infty$  as  $P_{i_1 i_2 \dots i_J}$  increases from zero to one.

The second restriction (and also the first) can be met by defining a *conditional logit* [Theil 1969]. For example, assume that we examine pairs of responses involving brands  $j$  and  $k$  ( $j \neq k$ ); more specifically, let us consider each pair as entailing brand 1 and brand  $k = 2, 3, \dots, J$ . If so, we can define the conditional logit for  $k \neq 1$  as the natural logarithm of the odds in favor of choosing brand  $k$  over brand 1:

$$L_{k(i_1 i_2 \dots i_J)} = \ln \left[ \frac{P_{k i_1 i_2 \dots i_J}}{P_{1 i_1 i_2 \dots i_J}} \right]. \quad (4)$$

Note that each of the equations (for  $k = 2, 3, \dots, J$ ) is based only on the ratios of the probabilities; absolute values of the probabilities will be determined by the condition that the sum over  $j = 1, 2, \dots, J$  equals unity.

To illustrate, if  $k = 2$ , the probability of choosing brand 2 is 0.45 and the probability of choosing brand 1 is 0.1, the conditional logit for brand 2 with respect to brand 1 as the reference brand is

$$L_{2(i_1 i_2 \dots i_J)} = \ln \left[ \frac{0.45}{0.1} \right] = 1.5041. \quad (5)$$

As Theil [1969] shows, by using this type of formulation, we satisfy both of the restrictions listed above.

#### Parameterizing the ELASTICON Model

In the ELASTICON model, we parameterize the conditional logit transformation by assuming a type of analysis-of-

variance (ANOVA) model (with interaction terms if desired) that relates the conditional logit for  $k=2,3,\dots,j$  relative to the reference brand, to the appropriate price levels of each set of profiles. That is, we assume a multivariate response:

$P_1, P_2, \dots, P_j$  in which the  $P_j$  denotes the amount of probability points assigned to brand  $j$  and where each respondent allocates 100 probability points (later converted to decimal fractions) over the set of brands in response to their specified prices.

The ANOVA-type model can be illustrated for  $k=2$  (that is, brand 2, relative to the reference brand 1) as:

$$L_{2(1)(i_1 i_2 \dots i_j)} \approx v_0 + v_{i_1} + v_{i_2} + \dots + v_{i_j} \quad (5)$$

where  $L_{2(1)(i_1 i_2 \dots i_j)}$  as in equation 4,  $v_0$  denotes the case in which all prices are at their reference levels (coded zero in dummy-variable form), the  $v_i$ 's denote the incremental (decremental) contribution of some nonreference price level  $i$  of the  $j^{\text{th}}$  brand, and  $\approx$  denotes approximation by least squares, dummy-variable regression. However, in this case *generalized* least squares regression is entailed, because the original responses ( $P_1, P_2, \dots, P_j$ ) on which the conditional logit is based are not independent (namely, their sum equals 100).

In the *Courtyard by Marriott* study, we used the ELASTICON model to estimate self and cross demand/price relationships if the *Courtyard* concept (or another concept, such as Hampton) was implemented and priced at different levels vis-a-vis its competitors. Table 3 shows how share of nights for a new hotel concept (for example, in this case, Hampton) might change from its base level of 18.0 percent to some other share level, as a function of its price vis-a-vis competitors' prices. Changes in its share are shown as a function of its prices and also as a function of new

Holiday and older Holiday prices. (Other effects were not statistically significant.)

### Computer Choice Simulation

The input to the computer choice simulation included for each respondent a vector of part worths for all the attributes included in the study and a corresponding vector of perceptions of each of a number of competing hotels. At the core of the simulation is a consumer choice rule [for example, first choice (select the hotel with the highest utility) or probability of choice (assign each hotel a probability of choice corresponding to the ratio of its utility to the total utility of all the hotels in the relevant competitive set)]. In our application the unit of measurement was the share of nights, calculated as the share of trips times the number of trips, times the average number of nights per trip.

The simulation was developed to allow management to find the desired configuration of hotel attributes and services which, in turn, was guided by the results of the hybrid conjoint analysis for each target segment. Once the concept profile was input, the simulator calculated total utility for the given concept versus the relevant set of competing hotels. Management could specify whether they wanted to use a first-choice rule or a probability-of-choice rule.

The control case (the share of choices received by Marriott without the new concept) provided another way to validate the results by comparing the share of choices generated by the simulator with the actual market shares of the various hotels. The particular simulator used in this study also contains a built-in resampling procedure (based on the bootstrap method of cross validation) that permits the researcher to obtain empirically based standard errors share of choices through repeated sampling of respondents' part worth and perceptions data.

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A. B. Bryan, Jr., Executive Vice-President and General Manager of *Courtyard by Marriott* writes: "In designing the actual product, the research allowed management to focus on the items customers wanted, and we avoided focusing on things important to management, but not important to the consumer. In the design stage, the focus was on creating a small hotel, with a great room, and excellent security, while being a home away from home.

*Courtyard* success led the way for the development of other customer-driven products, such as the acquisition of Residence Inn, the development of Fairfield Inn (economy segment) and Marriott Suites. These new products have

markedly contributed to the growth of Marriott Corporation.

With a good base on consumer research and the success we have had, it has been relatively easy to "sell" research in the division and to provide information for consumer-based decision making by management....

In order to deliver the *Courtyard* product the consumers wanted and at the price they wanted, we had to dramatically change the operating systems and organization structure standard to Marriott hotels....

The organizational structure surrounding *Courtyard* was designed to maximize customer and employee contact and to allow these people who are on the property to worry about one thing — taking care of the guest. All the support functions such as marketing, reservations, food and beverage, and accounting were centralized in a regional office. (We have four regions with each region ultimately running 50-100 *Courtyard* hotels.)...

I am convinced that we would not have had such a great product without the help of the study. (Of course, I'm biased.)