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Exploring the Use of the Abbreviated Technology Readiness Index for Hotel Customer Segmentation

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Abstract
Traditional tools used for segmenting hotel clientele rely on demographic and hotel-use characteristics (such as desired room type). However, with the emergence of self-service technologies and with technology-based components added to the list of hotels' service offerings, the authors propose using the abbreviated Technology Readiness Index (TRI) to improve the effectiveness of customer profiling, not only for technology use but also more generally for market segmentation. The abbreviated TRI was found to be a useful segmentation tool as it allows managers to form cohesive customer segments, each with a particular attitude toward technology and each with its own demographic characteristics and usage patterns. This study will help managers tailor their technology offerings to the needs and preferences of different segments based on their comfort with technology.

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Exploring the Use of the Abbreviated Technology Readiness Index for Hotel Customer Segmentation

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Traditional tools used for segmenting hotel clientele rely on demographic and hotel-use characteristics (such as desired room type). However, with the emergence of self-service technologies and with technology-based components added to the list of hotels' service offerings, the authors propose using the abbreviated Technology Readiness Index (TRI) to improve the effectiveness of customer profiling, not only for technology use but also more generally for market segmentation. The abbreviated TRI was found to be a useful segmentation tool as it allows managers to form cohesive customer segments, each with a particular attitude toward technology and each with its own demographic characteristics and usage patterns. This study will help managers tailor their technology offerings to the needs and preferences of different segments based on their comfort with technology.

Keywords: hotel marketing; market segmentation; hotel technology; guest preferences

The role of technology in hospitality services continues its long-standing expansion as hotels not only try to automate more parts of their service process but also seek to provide technology that meets guests' computing and connectivity needs. Properly implemented and positioned technology has the potential to build customer loyalty and can provide support for a hotel's differentiation efforts (Watkins 1999). Longtime industry observer Ed Watkins (1999, 12) suggested that "a new check-in system or an enhanced in-room entertainment offering or installation of high-speed internet access can produce the point of difference for a hotel." In keeping with this observation, we suggest that the right use of technology provides the opportunity to increase market share and is thus a critical issue for managers to consider.

In the midst of technology growth, hotel managers remain concerned about understanding their customers. Specifically, one category of apprehension involves "thinking strategically about marketing and customer segments to obtain competitive advantage" (Enz 2001, 40). Improving customer profiling to better understand the needs and preferences of different segments is of utmost importance when one is trying to remain ahead in the hospitality market (Enz 2001).

Technology is the specific focus for certain hotels. For example, Bly (2007) described "pod hotels," which were inspired by first-class airline cabins and are offshoots of Japan's coffin-like "capsule hotels." Such hotels are highly efficient in providing service to travelers who have long layovers at major airports or large cities. These hotels are relatively inexpensive but provide necessary services primarily through the use of technology (e.g., self-service check-in, iPod docking stations, free wireless internet phone calls). Examples of other hotels that serve a similar function are Yotel and Easy Hotel (London), Qbic and CitizenM (the Netherlands), Nitelite (United Kingdom, with expansion plans to the United States and Germany), Hotel SO (New Zealand), Tune Hotels (Malaysia), and Smart Inn (India). With many hotels targeting technology offerings to particular guests, it would be of value to managers to use a market segmentation approach that incorporates guests' attitudes toward technology.

Typical hotel segments are based on demographic and usage characteristics, such as traveler type, age, income, and purpose or frequency of travel. However, as previously mentioned, the substantial growth of technology in services has made it imperative for managers to also consider the level of comfort and feelings customers have toward the use of technology. In fact, at a recent service innovation roundtable, held at Cornell University during April 2008, conference participants, representing major service-oriented companies, stressed the importance of assessing and understanding customers' acceptance of technology to improve the potential of success for any innovation.

Although the need for a hotel customer segmentation strategy that considers a person's willingness to use technology seems clear, we have yet to see a study that addresses this issue empirically. Segmentation based on technology would aid hospitality managers in developing more successful roadmaps to align technology introductions with the needs (and attitudes) of various market segments. Part of our concern here is that research has pointed out that measures of technology readiness may be domain-specific and could suffer from reliability and validity

issues (Goldsmith and Hofacker 1991). In light of that concern, this study assesses the validity and reliability of the Technology Readiness Index (TRI) in the hospitality context and aims to address the following research questions:

Research Question 1: Can the abbreviated TRI be used as a means to classify customers into segments based on their technology readiness?

Research Question 2: Are there differences between these segments in regards to demographic and traveling characteristics?

Research Question 3: How can hotel managers use the abbreviated TRI to effectively introduce and incorporate technology within the service offering?

To measure a person's technology readiness, this study uses the TRI developed by Parasuraman and Colby (2001). The TRI measures a person's "propensity to embrace and use new technologies" (Parasuraman and Colby 2001, 18). In particular, the TRI incorporates people's feelings of optimism, innovativeness, discomfort, or insecurity towards the use of technology in a determination of a person's readiness to use technology. Furthermore, the TRI enhances the understanding of customers and can be used as a tool to segment a service's clientele (Parasuraman 2000; Parasuraman and Colby 2001; Tsikriktsis 2004; van der Rhee et al. 2007).

Parasuraman's initial TRI (2000) contained thirty-six different items, measured on a 5-point scale. In subsequent work, his scale was condensed into a ten-item abbreviated version that we employ here. The full abbreviated TRI is provided in the appendix, and examples for each of the TRI items are given below, with definitions from Parasuraman and Colby (2001):

Optimism: "Technology gives people more control over their daily lives" (p. 35).

Innovativeness: "In general, you are among the first in your circle of friends to acquire new technology when it appears" (p. 38).

Discomfort: "Sometimes you think that technology systems are not designed for use by ordinary people" (p. 41).

Insecurity: "You do not consider it safe giving out a credit card number over a computer" (p. 44).

This article proposes the abbreviated TRI as an enhanced method for customer segmentation. The remainder of the article is organized as follows. First, we review previous research regarding technology readiness and consumer innovativeness. Then we propose a set of general hypotheses linking technology readiness to the traditional segmentation descriptors, such as demographic background and usage characteristics. Next, we test our hypotheses using the abbreviated TRI to segment customers based on their technology readiness and statistically examine intergroup variations. We conclude by presenting the results, discussing the managerial implications of the study, and providing future research directions for technology readiness.

Technology Readiness Index and Innovativeness

As we said above, technology readiness describes a person's likelihood to use and appreciate new technologies. On a similar note, innovativeness, as defined in the product-development literature, is a person's willingness to adopt a new product (Tellis, Yin, and Bell 2004). The construct of innovativeness is related to technology readiness because both topics involve a person's willingness to accept a new idea, be it a new product or technology. For instance, one may presume that an unwillingness to deal with new experiences (i.e., noninnovative behavior) would prevent a person from actively seeking and enjoying

new technologies, while a zest for new ideas would have the opposite outcome. Not coincidentally, innovativeness is one of the four TRI dimensions. Thus, we suggest a conceptual overlap between the constructs and build from the product-development literature regarding innovativeness.

Demographic Characteristics

Research has associated customer innovativeness and the likelihood of adopting new products and ideas with such demographic characteristics as age, gender, income, and education. This body of literature has linked certain demographic characteristics with high (or low) innovative tendencies. So, for example, age and gender have been firmly linked to innovativeness. Young people have stronger innovative tendencies than do older people (Steenkamp, Hofstede, and Wedel 1999; Steenkamp and Burgess 2002; Venkatraman and Price 1990), and men have a higher propensity to adopt new products than women do (Steenkamp and Burgess 2002; Venkatraman and Price 1990). There is some indication that higher incomes and higher education are also associated with higher innovativeness. Along that line, Tellis, Yin, and Bell (2004) found that age, income, mobility, education, and gender were all predictors for levels of innovativeness. In their formulation, a "global innovator" is likely to be young, male, educated, and to have a relatively high income.

Im, Bayus, and Mason (2003) also examined the relationship between innovativeness and personal characteristics. They too found support that younger individuals with higher incomes have "innovative predispositions" that lead to the increased likelihood of new product adoption (see Im, Bayus, and Mason [2003] for a comprehensive review of the empirical studies in the new product literature regarding personal characteristics and innovativeness). Chandrasekaran and Tellis (2008) took a higher-level view and assessed the connection between income and innovativeness. They also tied country-specific innovativeness to national wealth.

Additionally, new product adoption (Mittelstaedt et al. 1976) has been linked to the sensation-seeking literature (Zuckerman 1979). Sensation seeking has been firmly tied to demographic characteristics (Zuckerman, Eysenck, and Eysenck 1978). For instance, younger males were found to have the highest inclination for sensation seeking.

Service marketing and management literature has found persistent differences between the demographic characteristics of various TRI-based segments. Parasuraman and Colby (2001) identified the following five technology-related groups: explorers, pioneers, laggards, paranoids, and skeptics. They related that explorers were typically affluent, highly educated males in their late twenties and early thirties. On the other hand, laggards tend to be women over the age of forty-five with lower income and education levels (please see Parasuraman and Colby [2001] for a comprehensive list of their group descriptions).

In support of the empirical evidence from the product adoption and TRI literature, the following hypothesis is posited.

Hypothesis 1: Technology readiness is associated with an individual's demographic characteristics.

Travelers' Characteristics

As before, we suggest that there is a conceptual tie between the research on innovativeness, which is a person's positive attitude toward new things and experiences (Midgley and Dowling 1993; Midgley and Dowling, 1993; Shih and Venkatesh 2004), and a person's likelihood to embrace new technology. Previous work has linked early stage product adoption to consumers' novelty-seeking tendencies (Manning, Bearden,

and Madden 1995), and the use of emerging self-service technologies has been tied to guests' inherent novelty seeking predispositions (Dabholkar and Bagozzi 2002).

Sensation seeking (Zuckerman 1979), which includes novelty seeking as one of its dimensions, has also been linked with new product adoption (Mittelstaedt et al. 1976). It has been proposed that one way people satisfy their need for novelty seeking is through travel. In fact, some of the scale items that are used to measure novelty-seeking tendencies (e.g., Zuckerman's [1979] sensation-seeking scale) directly evaluate people's attitudes toward traveling to unfamiliar places; being bored of staying home for extended periods of time; and needing to see new, unfamiliar faces. Therefore, we propose that a person's propensity to travel is related to the person's technology readiness, as stated below in hypothesis 2. However, to our knowledge, the direct link between technology readiness and travel propensity has not been established empirically.

Hypothesis 2: Technology readiness is associated with an individual's traveling characteristics.

We also stipulate that the desire for novelty, risk, and experience seeking, which are parts of the sensation-seeking scale, leads people to choose jobs that require extensive travel. Likewise, people who frequently travel for their jobs could simply be "pushed" to become more technology-ready by circumstance. Hence, an association between business travel and technology readiness level is posited, as follows:

Hypothesis 3: There is an association between technology readiness and business travel.

It is also proposed that a person's technology readiness can determine the typical type of hotel and room a person tends to stay in. It would be of interest to managers to know whether certain TRI groups have higher likelihoods of buying premium accommodations. Thus, the last hypothesis examines the association between the type of hotel accommodations used by a person and his or her technology readiness.

Hypothesis 4: Technology readiness is associated with an individual's choice of hotel accommodations.

Study Setting and Data Collection

We studied the attitudes of travelers who had stayed at a hotel in the United States within the year prior to our study. We asked a reputable marketing research company to develop a representative sample of United States travelers. The firm provided us with a reliable electronic mailing list of 4,000 potential respondents who represent a balanced sample of respondents—that is, they reflect the spread of demographic backgrounds within the United States. The lead researcher sent each of the potential respondents an invitation via e-mail to participate in the web survey. Respondents were offered the opportunity to win one of ten $100 gift certificates for participating in the study. Of the 4,000 potential respondents, 2,500 agreed to participate. Every one of these people was asked the same screening question: "Have you traveled in the past year?" This ensured that survey respondents would be familiar with and had current experience staying at hotels. Approximately 40 percent of those willing to participate had not stayed in a hotel in the previous year. They were excused and thanked for their willingness to join in the survey. At the conclusion of the three-week data-collection period, a total of 930 respondents had completed and returned the survey. (Our

test showed no response bias.) The sample of 930 was reduced to 865 due to missing data. Thus, results are based on 865 survey responses.

Survey Design

The survey consisted of four sections. First, respondents were asked questions about their frequency of hotel stay. They were then asked questions regarding their most recent hotel stay and related to their next hotel stay. Next, respondents were given the ten-item abbreviated TRI questions to estimate their TRI score. Finally, in the concluding section of the survey, respondents were asked traditional demographic types of questions such as age and gender.

To test the survey for both simplicity and ease of understanding, the survey was pretested with twenty-five random hotel customers. On average, the pretested individuals took approximately twenty minutes to complete the survey and exhibited no signs of difficulty in understanding survey questions.

Sample Characteristics

The sample consisted of approximately a 50-50 split of men and women. The majority of the respondents were between the ages of twenty-six and fifty-five. Around 40 percent of the sample had some college education, while 25 percent had a college degree. The sample included a range of incomes, with around 60 percent of the individuals making $25,000 to $75,000 dollars a year.

In addition to examining the demographic characteristics of the survey participants, we also examined their traveling characteristics. The majority of the respondents reported taking between one and three trips in the previous twelve months. In addition, a large percentage of the respondents had traveled in the prior six months. Many of the respondents spent less than $100 per night on their room. Eighty-one percent of the respondents were staying in standard types of rooms. Finally, approximately 75 percent of the respondents were traveling for leisure on their most recent trip.

Results

First, we assessed the validity of the TRI construct by conducting a factor analysis on the abbreviated TRI to make sure that all ten TRI items loaded on the appropriate factor relating to that item (i.e., innovativeness, optimism, discomfort, and insecurity). This was especially important since we used the abbreviated version of the TRI. This factor analysis revealed that only two factors had eigenvalues greater than 1, which is the traditional cutoff value. However, research suggests that the eigenvalue cutoff is arbitrary and should be chosen such that the results provide the best trade-off between parsimony and managerial usefulness. Therefore, following Rust, Lemon, and Zeithaml (2004), we set a cutoff value of .5.[1] The resulting factor structure matches the one identified in previous TRI-related studies (e.g., Parasuraman 2000; Tsikriktsis 2004; van der Rhee et al. 2007). The resulting four factors not only contained all the questions from the abbreviated TRI, but also had only one cross-loading that was greater than .30.

Next, the reliability of the scale was assessed by reverse-coding the discomfort and insecurity items and calculating the Cronbach's alpha coefficient for the overall ten-item scale (Cronbach 1951). The Cronbach's alpha for this sample was .765, which exceeds the .7 cutoff level suggested by Nunally (1978). Additionally, a value of .765 greatly exceeds the more lenient levels suggested as suitable for exploratory research (Peter 1979). Furthermore, all ten items improved the reliability score. Exhibit 1 provides a

1. In a relevant study, van der Rhee et al. (2007) also had to adjust the cutoff level when the abbreviated Technology Readiness Index (TRI) scale was used in place of the original.

Exhibit 1:
Technology Readiness Index (TRI) Factor Loadings and Reliability Analysis

	PCA[a]				Reliability[b]	
	Factor 1	Factor 2	Factor 3	Factor 4	Cronbach's α if Item Is Deleted	Cronbach's α (Scale)
INNOVATIVENESS1[c]	.334		.581		.745	.765
INNOVATIVENESS2			.851		.759	
OPTIMISM1	.808				.739	
OPTIMISM2	.742				.742	
OPTIMISM3	.689				.746	
DISCOMFORT1				.602	.736	
DISCOMFORT2				.864	.754	
INSECURITY1		.712			.733	
INSECURITY2		.817			.758	
INSECURITY3		.715			.742	

a. The table presents the results of principal component analysis (PCA) using varimax rotation with Kaiser normalization (rotation converged in five iterations). Factor loadings less than .3 are deleted from the table.
b. Discomfort and insecurity items were reverse-coded for the purpose of reliability analysis.
c. Exact items can be found in the appendix.

summary of the internal consistency of the measurement scale.

Next, cluster analysis was used to classify survey participants into different segments based on their answers to the TRI questions. It is important to note that an exact match for all five segments outlined in Parasuraman and Colby (2001) was not expected since the segments were likely to vary based on the population of interest (e.g., Tsikriktsis [2004] found evidence for four rather than five segments in his British data set). Since this study concentrates on recent U.S. travelers only, we anticipated that the classification scheme would differ from those of earlier studies. Furthermore, another reason our classification could be different was that this study used the abbreviated TRI rather than the full version.

A two-step cluster analysis procedure in SPSS was used to automatically identify the appropriate number of clusters. The first step of the procedure calculated the Schwarz's Bayesian information criterion (BIC) for each number of clusters within a specified range. This finds the initial estimate for the number of clusters. The second step refines the initial estimate by finding the greatest change in distance between the two closest clusters in each hierarchical clustering stage. Based on this procedure, the three-cluster solution emerged as most appropriate. The "elbow" scree plot examination method further supports the three segment solution, as shown in Exhibit 2. The three clusters that emerged are balanced in terms of size. Cluster two was slightly smaller than the other two clusters. Exhibit 3 depicts the size of each cluster and what percentage of the total sample size it represented.

The three clusters that emerged were similar to the explorer or pioneer, paranoids, and laggard clusters identified and described in Parasuraman and Colby's (2001) work. The first cluster contains

Exhibit 2:
Schwarz's Bayesian Criterion Scree Plot

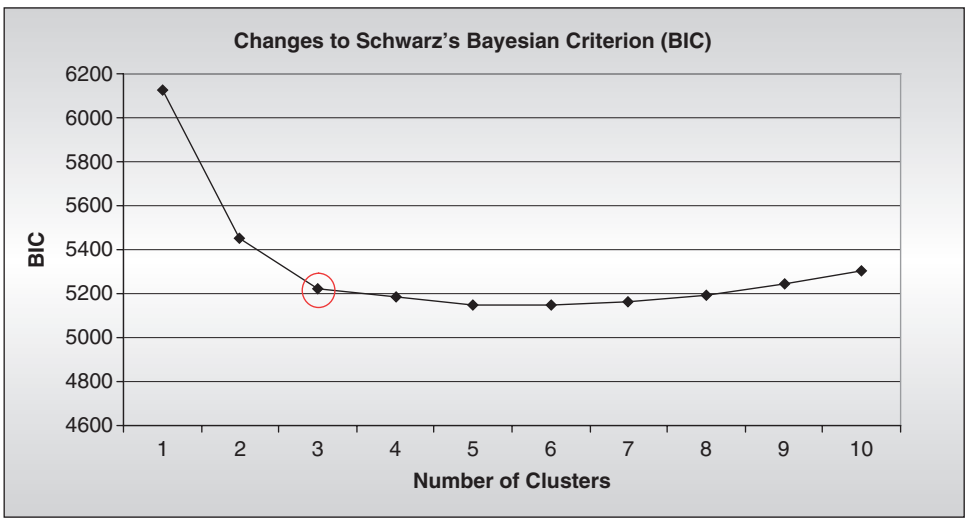

Exhibit 3:
Distribution across the Different Clusters

Cluster	*N*	*% of Total*
1. INNOVATORS	335	38.7
2. PARANOIDS	211	24.4
3. LAGGARDS	319	36.9
Combined	865	100.0

people who are innovative and optimistic about the use of technology and score low on both discomfort and insecurity dimensions. Since the use of the abbreviated TRI resulted in the inability to distinguish between pioneers and explorers, we refer to this segment as *innovators*. This cluster represents those individuals who are highly ready to adopt technology. Cluster two was composed of travelers who were also innovative and optimistic. However, they were also concerned about the downsides of technology and score high on discomfort and insecurity dimensions. Following Parasuraman and Colby, we refer to this segment as *paranoids*. The third segment contains *laggards*, or people who resist the use of technology. Exhibits 4 and 5 provide the cluster means and statistical tests for the significance of the mean differences. Moreover, the three clusters that emerged in our study were well defined. The discriminant analysis produced a 96.4 percent hit rate, as shown in Exhibit 6.

Demographic Segment Comparison

The three segments were evaluated to determine whether the derived segment membership was informative in predicting a person's demographic and traveling characteristics. Exhibit 7 depicts the percentage cross-tabulations for the three groups and the demographic variables. Support was found for the proposed relationship that individuals who are more receptive to technology, called innovators, were more likely to be male, educated, wealthier, and younger than other respondents. Alternatively, laggards, or those were not inclined to adopt

Exhibit 4:
Cluster Means for the Technology Readiness Index (TRI) Dimensions

			95 Percent Confidence Interval	
Cluster	*Mean*	*Standard Error*	*Lower Bound*	*Upper Bound*
INNOVATIVENESS				
INNOVATORS	7.639	.084	7.474	7.803
PARANOIDS	7.427	.106	7.219	7.634
LAGGARDS	5.335	.086	5.167	5.504
OPTIMISM				
INNOVATORS	13.609	.084	13.443	13.775
PARANOIDS	13.204	.106	12.995	13.413
LAGGARDS	9.752	.087	9.582	9.922
DISCOMFORT				
INNOVATORS	3.773	.084	3.608	3.938
PARANOIDS	5.569	.106	5.361	5.777
LAGGARDS	5.818	.086	5.649	5.987
INSECURITY				
INNOVATORS	6.681	.115	6.455	6.906
PARANOIDS	11.398	.145	11.114	11.683
LAGGARDS	10.470	.118	10.239	10.702

new technology, were more likely to be female, less educated, of a lower income, and older than members of other groups. The demographic characteristics of the paranoids, on the other hand, were more evenly distributed across the demographic categories, but the age of the paranoids segment was similar to that of innovators. That is, paranoids tended to be younger than laggards were.

Next, a Pearson chi-square analysis was conducted to provide a more formal testing of demographic differences between the three groups. This statistical procedure was chosen due to the categorical nature of the data and the exploratory focus of this study. After conducting the associative analysis, we found a significant relationship between the demographic variables of interest and group membership. Exhibit 8 provides the chi-square tests' outcomes that support hypothesis 1.

Comparison of Segments' Traveling Characteristics

The traveling characteristics assessment dealt with frequency of travel as well as the typical traveling style attributed to particular segments. Exhibit 9 depicts the percentage cross-tabulations for the three groups and the traveling characteristics variables. Results show that innovators and paranoids tend to travel more frequently than laggards do. In addition, innovators and paranoids also had traveled more recently than had laggards and would be taking their next trip sooner than laggards would. Also, it was found that innovators and paranoids were more likely to be traveling on business. On the other hand, the laggards segment comprised less frequent travelers who were more likely to be traveling on leisure.

After examining the descriptive data for the three clusters, a chi-square analysis was

Exhibit 5:
Pairwise Comparison of Cluster Means

(I) Cluster	*(J) Cluster*	*Mean Difference (I-J)*	*Standard Error*	*Sig. (a)*
INNOVATIVENESS				
INNOVATORS	PARANOIDS	0.212	.135	.116
	LAGGARDS	2.303	.120	.000
PARANOIDS	INNOVATORS	–0.212	.135	.116
	LAGGARDS	2.091	.136	.000
LAGGARDS	INNOVATORS	–2.303	.120	.000
	PARANOIDS	–2.091	.136	.000
OPTIMISM				
INNOVATORS	PARANOIDS	0.405	.136	.003
	LAGGARDS	3.857	.121	.000
PARANOIDS	INNOVATORS	–0.405	.136	.003
	LAGGARDS	3.451	.137	.000
LAGGARDS	INNOVATORS	–3.857	.121	.000
	PARANOIDS	–3.451	.137	.000
DISCOMFORT				
INNOVATORS	PARANOIDS	–1.796	.135	.000
	LAGGARDS	–2.045	.120	.000
PARANOIDS	INNOVATORS	1.796	.135	.000
	LAGGARDS	–0.249	.137	.068
LAGGARDS	INNOVATORS	2.045	.120	.000
	PARANOIDS	0.249	.137	.068
INSECURITY				
INNOVATORS	PARANOIDS	–4.718	.185	.000
	LAGGARDS	–3.790	.165	.000
PARANOIDS	INNOVATORS	4.718	.185	.000
	LAGGARDS	0.928	.187	.000
LAGGARDS	INNOVATORS	3.790	.165	.000
	PARANOIDS	–0.928	.187	.000

conducted to test the significance of the association between cluster membership and respondents' travel characteristic variables (e.g., frequency, how recent the last trip was, and reason for travel). Exhibit 10 depicts the results of this analysis. We find significant differences between clusters with regard to the number of trips taken in the previous twelve months, expected timing of the next visit, and reason for travel. The association for the timing of the most recent trip was only marginally significant. We did not find significant differences between the clusters with respect to the likelihood of weekend vs. weekday travel.

In summary, we find support for hypothesis 2, as frequency of travel variables (timing of the next trip and number of trips in the last twelve months) were found to be firmly linked to the TRI segment membership. The analysis also supports hypothesis 3. Even though there are no significant differences in weekend versus weekday travel, we find a strong link between cluster membership and

Exhibit 6:
Discriminant Analysis Classification

	Predicted Group Membership			
Two-Step Cluster Number	*1*	*2*	*3*	*Total*
Original count				
1	331	1	3	335
2	10	195	6	211
3	6	5	308	319
Percentage				
1	98.8	0.3	0.9	100.0
2	4.7	92.4	2.8	100.0
3	1.9	1.6	96.6	100.0

Exhibit 7:
Cross-Tabulations for Technology Readiness Index (TRI) Clusters and Demographic Variables (in percentages)

		Cluster		
Characteristic	*Category*	*Innovators*	*Paranoids*	*Laggards*
Age	18-25	7.20	8.10	6.00
	26-40	29.10	30.50	17.00
	41-55	45.60	43.80	49.40
	56 or older	18.00	17.60	27.70
Gender	Male	56.70	49.80	44.00
	Female	43.30	50.20	56.00
Education	Less than high school	0.00	1.00	1.90
	High school diploma	12.50	14.40	23.30
	Some college	34.90	41.10	43.70
	College degree	29.90	26.80	19.50
	Graduate degree	22.70	16.70	11.60
Income	$10,000 or less	0.60	1.10	1.80
	$10,001-$25,000	7.60	12.40	13.50
	$25,001-$50,000	27.70	29.60	40.60
	$50,001-$75,000	32.50	31.70	22.80
	$75,001-$100,000	13.70	16.10	15.30
	$100,001-$125,000	6.70	5.40	1.80
	$125,001-$150,000	5.40	2.20	2.80
	$150,001 or more	5.70	1.60	1.40

propensity to travel on business. We can think of several explanations for the lack of the weekend and weekday differences. Innovators could be attending national conventions of conferences that often take place over the weekend, for instance, while some of the laggards may be retired and thus more likely to travel during the week.

Exhibit 8:
Pearson Chi-Square Analysis—Demographic Characteristics

	Pearson χ^2 Value	*df*	*Asymp. Sig. (2-Tailed)*
AGE	23.775	6	.001
GENDER	10.549	2	.005
EDUCATION	40.564	8	<.001
INCOME	44.068	14	<.001

Exhibit 9:
Cross-Tabulations for Technology Readiness Index (TRI) Clusters and Traveling Characteristics Variables (in percentages)

		Cluster		
Characteristic	*Category*	*Innovators*	*Paranoids*	*Laggards*
Number of trips	1-3	55.4	57.8	72.2
	4-6	27.5	26.1	20.6
	7-10	10.5	7.6	4.4
	11-20	2.4	4.7	1.3
	More than 20	4.2	3.8	1.6
Most recent trips	Within the last month	26.9	27.5	17.2
	Within the last 1-3 mos.	29.9	30.3	33.2
	Within the last 4-6 mos	27.8	24.2	29.2
	Within the last 7-12 mos.	15.5	18.0	20.4
When next visit	Within the next week	7.0	8.6	5.4
	Within the next month	26.1	21.6	15.7
	Within the next 2-3 mos.	26.1	28.1	30.0
	Within the next 4-6 mos	20.4	24.3	19.3
	Within the next 7-12 mos.	15.3	15.1	21.4
	More than 1 year from now	5.1	2.2	8.2
Weekend or weekday	Weekend	62.4	67.8	65.5
	Weekday	37.6	32.2	34.5
Business or leisure	Business	31.0	29.4	17.6
	Leisure	69.0	70.6	82.4

In addition to assessing the frequency and reason for travel, we also examined the person's traveling style. Exhibit 11 summarizes the resulting cross-tabulation percentages. In regards to the room rate, type of room, and type of hotel, it was found that the paranoids group tended to be in the middle of the extremes associated with innovators and laggards. Innovators were more likely to stay in suites, frequent upscale or midrange hotels,

Exhibit 10:
Chi-Square Tests—Traveling Characteristics

	Pearson χ^2 Value	*df*	*Asymp. Sig. (2-Tailed)*
Number of trips	29.433	8	<.001
Most recent trip	12.365	5	.054
When next visit	23.067	10	.011
Weekend or weekday	1.744	2	.418
Business or leisure	17.610	2	<.001

Exhibit 11:
Cross-Tabulations for Technology Readiness Index (TRI) Clusters and Additional Traveling Characteristics Variables (in percentages)

		Cluster		
Characteristic	*Category*	*Innovators*	*Paranoids*	*Laggards*
Room rate	Less than $40	5.6	5.8	7.9
	$41-$60	21.1	27.2	27.4
	$61-$80	23.6	22.8	22.9
	$80-$100	21.4	17.5	19.5
	$101-$125	10.6	10.2	8.2
	$125-$150	6.8	9.2	6.5
	$151-$175	2.8	2.4	1.7
	$175-$200	3.4	2.4	1.7
	$201 or more	4.7	2.4	4.1
Room type	Standard room	77.9	83.6	82.6
	Suite	22.1	16.4	17.4
Upscale hotel	None	52.1	52.9	62.5
	1-3 nights	23.7	29.3	27.9
	4-6 nights	9.3	7.7	4.8
	7-10 nights	7.5	5.3	2.5
	11 or more nights	7.5	4.8	2.2
Midrange hotel	None	18.3	19.0	21.4
	1-3 nights	34.2	41.9	44.0
	4-6 nights	21.0	18.6	17.9
	7-10 nights	12.6	10.5	7.5
	11 or more nights	13.8	10.0	9.1
Economy hotel	None	45.2	35.7	47.6
	1-3 nights	35.0	37.7	33.4
	4-6 nights	9.6	14.0	10.4
	7-10 nights	4.5	6.3	4.4
	11 or more nights	5.7	6.3	4.1

and stay for longer periods of time compared to the other segments. Laggards tended to pay the lowest room rate in comparison to the other segments. As a result, they were also more likely to have stayed in a standard room and were least likely to stay in an

Exhibit 12:
Chi-Square Tests—Additional Traveling Characteristics Variables

	Pearson χ^2 Value	*df*	*Asymp. Sig. (2-Tailed)*
Room rate	12.022	16	.742
Room type	3.370	2	.185
Upscale hotel	27.106	8	.001
Midrange hotel	13.612	8	.092
Economy hotel	9.755	8	.283

upscale or midrange hotel. Using more formal testing, we find support for hypothesis 4, which posited that TRI segments would have an association with the hotel type. The chi-square analysis revealed an association between staying in upscale and midrange hotels and technology-readiness group membership. Exhibit 12 depicts this analysis.

Discussion and Future Research Directions

We found that the abbreviated TRI was a reliable method for segmenting customers. We have demonstrated the distinct differences that occur between U.S. hotel guests based on their technology readiness. Also, we provide an initial set of generalizations about using the abbreviated TRI for customer segmentation within the hospitality domain. Furthermore, the results of this study have direct implications for hotel managers, as we explain below.

Regarding innovators, managers of premium or luxury hotels should pay special attention to technological innovations at their establishments, because their guests are most likely to want to have the latest technology available. These clients have more disposable income and are more likely to be traveling on business than other guests, meaning that hotels could consider charging a premium for add-on technology services. This is congruent with the current industry practice in which economy hotels usually provide free wi-fi, while higher-end hotels charge a fee to log onto their network. The findings also suggest that the best way to attract high-end clientele may involve online advertising and technology-related promotions.

As previously mentioned, innovators are more likely to seek upgraded rooms, but we must caution that we did not find a statistically significant association between room rate and segment membership. Ironically, we must suggest that such a relationship was not found due to innovators' technology use. It is likely that innovators are savvier about finding hotel deals and promotions and may not pay the full room rate of an upscale hotel, perhaps by taking advantage of Priceline.com, Kayak, or Hotwire.com. Furthermore, we believe that these frequent travelers are able to take advantage of corporate discounts and extended stay deals. Therefore, much more research is needed to evaluate the buying process differences associated with particular segments.

In addition, customers with high technology readiness are often the ones who fall into the "road warrior" category (innovators are likely to take extended stays; the difference is especially apparent for trips longer than seven days; see Exhibit 11). Therefore, frequent flyer and frequent guest programs should become a strong component for improving customer retention. For instance, hotels may provide automated travel management tools for the true "road warriors," such as updated and integrated

frequent flyer information linked with frequent hotel guest information or airline check-in via in-room TV interface. Cross-promotional possibilities and exchanges of miles and points may also be desirable for innovators. Hotels may also want to align their gift shop merchandise to the needs of this segment. For instance, gift shops may offer in-flight use adaptors that allow users to stay productive on longer flights and offer the latest in miniature gadgets suitable for frequent travelers.

Guests who are frequently on the road may also desire the technology tools that would allow them to conduct remote meetings or simply stay in touch with their families and friends. For instance, basic teleconferencing hubs fitted for easy use with personal laptops could help these guests achieve their desired level of connectivity. Other features such as digital picture frames that upload guests' images upon check-in (or restore default settings at checkout) could be valuable for those on extended business trips.

We found it interesting that the paranoids segment was so large. Given their insecurity regarding technology, we see this as an opportunity for hotels to ease their concerns, particularly by explaining the methods by which the hotel ensures internet security and addresses privacy concerns. Though they are leery of technological pitfalls, paranoids are also excited by and optimistic about technology they find safe. For this clientele, "safer" types of offerings that do not require personal information sharing may be more desirable (e.g., in-room universal cell phone chargers, or multimedia and gaming options rather than teleconferencing options). These strategies will help obtain customer trust and consequently increase the revenues from technology based services.

In addition to addressing the paranoids' security concerns, hotels should bring in laggards by improving their technology's user-friendliness (e.g., simplifying connectivity tools, improving website navigation, and ensuring easy access to help features and personal assistance). Hotels should also pay particular attention to this segment when soliciting customer feedback and designing promotional campaigns. To meet the needs of this segment, hotels must continue to provide an option of personal face-to-face interaction (or mail-based communication) rather than strictly using various technology-based interfaces.

The research we present here is exploratory in nature, but it provides a valid basis for future inquires into aligning hotels' technology offerings with the needs of different guest segments. More research is needed to determine what strategies are suitable for particular customer segments. For instance, it would be interesting to investigate the extent to which a guest's choice of hotel is driven by technology availability and pricing, so that one could derive approximate price elasticities across different segments. The outcome of such analysis would be hard to predict because, on one hand, technology-adept guests may place a higher premium on the availability of technology and be less price-sensitive due to their higher incomes or the fact that they are traveling on business. On the other hand, those same guests may be reluctant to pay for internet access since they consider it a necessity rather than a luxury and are more likely to use Virtual Private Network (VPN) tools provided by their employers or personal handheld PDAs.

In addition, more empirical research is needed to provide the exact definition of guest clusters based on technology acceptance in a hospitality setting. It is likely that particular segments require drastically different service offerings. Creation of technology-based profiles for each group would be valuable to hotel managers and help managers tailor their hotel's technology

offerings to its clientele. We suggest the use of choice experiments to derive essential sets of technology tools required by each segment for future research (see Verma and Plaschka 2003; Verma, Plaschka, and Louviere 2002). Choice experiments determine customers' preference structures by examining the trade-offs made while making a series of choices. Customers select the preferred option among a set of hypothetical profiles that are described in terms of experimentally designed attribute combinations. In addition to traditional choice modeling procedures (e.g., multinomial logit models), one could also use noncompensatory modeling techniques (e.g., Yee et al. 2007; Gilbride and Allenby 2004) to arrive at sets of "must-have" features for different customer types. Noncompensatory modeling is particularly suitable for identifying the "must-have" features because it uncovers unacceptable attribute levels and different screening strategies used by different consumers.

It would also be of interest to study the technology readiness issues and contrasting requirements of business and leisure travelers. For instance, innovators, seeking novel experiences, may be interested in frequent-flyer miles or hotel points-based promotions rather than discounts when traveling on business. This would allow them to go on reward-based leisure trips to destinations they might not otherwise visit. This area is especially interesting due to the implications this research has on the design of loyalty programs as well as corporate travel policies. Further inquiries about the particular needs and preferences of each travel segment along with more clearly defined technological requirements would further enrich hotel customer segmentation.

In addition, future research should consider using longitudinal data to study transient and evolutionary effects with regard to people's reactions to hotel technology. It is possible that the relative sizes of different segments are changing as technology evolves, or in response to various technology-related news and events (e.g., some people may become paranoid when they become aware of or become victims of various cybercrimes). It would also be interesting to see how the technologies that were initially viewed as risky are diffusing to less technology-savvy segments overtime. In this respect, we see a lot of potential in trying to synergize the technology readiness based segmentation with traditional diffusion frameworks. Finally, it would be helpful to generalize this research by examining the usefulness of technology-readiness-based customer segmentation across different industries.

Overall, technological innovation can be a way for hotels to set themselves apart in the competitive hospitality market. This study finds that particular segments have distinct differences in regards to their technology acceptance level, as well as their demographic makeup and traveling style. Thus, we suggest that it is imperative to consider a person's technology readiness when segmenting hotel customers.

Appendix
The Abbreviated Technology Readiness Index (TRI)

The following ten questions are used in a survey to measure technology readiness: the factor name is in parentheses after each question and was not shown to the respondents:

Q1: I can usually figure out new hi-tech products and services without help from others. (Innovativeness 1)

Q2: New technology is often too complicated to be useful. (Discomfort 1)

Q3: I like the idea of doing business via computers because you are not limited to regular business hours. (Optimism 1)

(continued)

Appendix (continued)

Q4: When I get technical support from a provider of a high-tech product or service, I sometimes feel as if I'm being taken advantage of by someone who knows more than I do. (Discomfort 2)

Q5: Technology gives people more control over their daily lives. (Optimism 2)

Q6: I do not consider it safe giving out credit card information over a computer. (Insecurity 1)

Q7: In general, I am among the first in my circle of friends to acquire new technology when it appears. (Innovativeness 2)

Q8: I do not feel confident doing business with a place that can only be reached online. (Insecurity 2)

Q9: Technology makes me more efficient in my occupation. (Optimism 3)

Q10: If you provide information to a machine or over the internet, you can never be sure if it really gets to the right place. (Insecurity 3)

Each question was answered on a Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (5).

Source: Parasuraman and Colby (2001).

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