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Evaluating Airport Terminals from the Users' Perspective: Are Service, Experience, Liking, and Satisfaction Equivalent?

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Abstract

In the era of globalization and the deregulation of the air transportation industry, public and private stakeholders have been increasingly interested in making airports attractive for passengers and airlines. Multiple service-like indicators (i.e., satisfaction, experience, liking, and quality of service) have been used to evaluate transportation infrastructure and systems, including airport terminals. Despite literature providing a clear definition of the different indicators separately, the similarities and differences are not clear, nor is it clear whether they are equivalent and could be used interchangeably. The purpose of this paper is to further understanding of the roots and essence of the four frequently used service indicators (SIs) in airport terminals—namely satisfaction, liking, quality of service, and experience—by comparing regressors. Using a travelers' perception survey ($N = 377$) at the domestic terminal in Bogotá's El Dorado Airport, we found that, despite their correlation, the four service proxies were, in essence, different from each other conceptually, meaning that they have to be carefully chosen for the successful evaluation of a terminal. Each SI comprises different categories, representing a unique user perception. Recognizing and acknowledging that all these terms are different furthers the transparency in defining what each indicator measures.

Keywords

aviation, airport terminals, airport planning, public transportation, customer satisfaction/loyalty, customer service, quality

Understanding service and performance indicators and the elements that influence them constitutes a key strategy for planning competitive and attractive airports with loyal users. This is key in a context where the deregulation of the air transport industry in many parts of the world has challenged the monopolistic approach to airports of the past and has led to competition (*1*). Therefore, public and private stakeholders are becoming increasingly interested in making airports attractive for passengers and airlines alike (*2*, *3*), thus equipping airports for marketing by allocating more resources and satisfying their marketing needs with extra personnel (*1*). Local and national governments are now also interested in having busier airports, not only for the profit from value-added tax, but also as a strategy for local

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development (*4*), employment, and promoting a city's image (*2*) among other benefits (particularly considering the economic recovery expected after the COVID-19 pandemic [*5*]). In turn, tools for evaluating a terminal's performance are used to reveal the critical factors that influence users' perceptions and post-use behaviors (i.e., recommendation and loyalty [*6*]). With this information, management can structure plans to increase airport competitiveness and attractiveness. However, the performance indicators used to evaluate airports seem to have been used interchangeably and there is no agreement on their differences. In this research, we aimed to provide a basis for understanding some different performance indicators and their correlates.

Given that users are key stakeholders when evaluating transportation services, there has been growing interest in assessing customer perceptions when referring to transportation infrastructure (*7*, *8*). Customer surveys are often used by service industries to meet this goal, as they help to identify the priorities for service improvement (*9*). Different standard methods or procedures have been implemented to measure airport terminal services overall. The Airport Service Quality by Airports Council International is an example of a user-oriented method that determines a worldwide airport benchmark through passenger satisfaction while traveling through an airport. Another well-known example is Skytrax's airport performance assessment and benchmarking, which evaluates performance on 11 categories and 39 subcategories of an airport's service scope. Skytrax computes a 1- to 5-star grade for each terminal, and an overall airport rating can be obtained by aggregation.

Different performance, service, or quality proxies or indicators (hereafter referred as to service indicators; SIs), such as user satisfaction, quality of service, and level of service (LOS), are frequently used for airport terminals and other transportation services and infrastructures. The average of the users' SI rates is a common measure of service or infrastructure. These variables are frequently used as dependent variables in multivariate models (linear or discrete), to better understand what influences a good or bad service. The most frequently adopted SI in terminal evaluation is quality of service (QoS) (*3*, *10–14*), followed by satisfaction (*4*, *15–18*), experience (*6*, *19–22*), and LOS (*23–25*). Other studies have also considered comfort a target variable to be studied (*26*).

These SIs, although similar, may differ from each other considerably and, thus, must be treated with caution to avoid using terms interchangeably (*27*). The literature currently shows no consensus in relation to the nature and directionality of the influences between SIs (*27*). This justifies an evaluation of the SIs and the comparison between them. In the current context of airport competition, a better understanding of the scope and the differences among SIs will be key. Comparing these SIs within the same context will reveal the root and essence of each SI, in contrast to others.

The purpose of this study was to explore differences and similarities of four SIs: satisfaction, liking, QoS, and experience, using an airport perception survey ($N = 377$) at El Dorado International Airport's main terminal in Bogotá, Colombia. Randomly selected respondents rated all four SIs as well as an extensive list of the terminal's attributes, that serve as regressors. Next, we compared the regressors explaining each of the four dependent variables (i.e., SIs) using multivariable linear models.

The rest of this paper includes a literature review in which the SIs are presented and described, a methodology section in which our modeling approach is explained, and results and discussion sections presenting and analyzing our most relevant findings.

Literature Review

Measuring user perceptions of the performance of infrastructure and services has received a great deal of attention in recent years, as different SIs have been associated with behavioral intentions (*28*), loyalty (*29*), and post-purchase behaviors (*30*), which are key in the current context of competition and deregulation. This kind of evaluation has frequently been used to assess airport terminals, as they highlight the factors that affect user perceptions of a terminal. However, such evaluations of airports and other transportation infrastructure have employed a diverse range of dependent variables to assess the service provided. For example, among the vast literature, Allen et al. evaluated satisfaction (*31*), whereas Bezerra and Gomes focused on a service quality evaluation (*32*). Brink and Maddison considered LOS (*33*), whereas Harrison concentrated on experience (*34*).

These SIs do not necessarily lead to the same user responses, which can vary in nature (e.g., cognitive, affective responses, or both) but often seem to be intertwined in the literature (*5*, *22*, *35*). Research shows that in some cases these SIs are dependent on one another. For example, studies have found that memorable experiences can be partially explained by being satisfied with an airport's attributes and/or by positively evaluating the airport's QoS (*5*, *22*). Another study shows that affective images mediate between the perceptions of and satisfaction with an airport's attributes, which highlights the relationship and temporal precedence between these two SIs (*13*). QoS also proved to be a correlate of satisfaction in the studies by Hong et al. (*36*) and Saut and Song (*17*). In all of these studies, the individual SIs not only showed some sort of interdependence, but different response sources (i.e., cognitive, affective, and behavioral) were

highlighted as coming into play when evaluating an airport. To understand how the interactions occur, however, each SI requires a specific description.

In analyzing each of the four SIs to be explored, we found studies that helped to unveil them their meanings separately. Firstly, according to Oliver, satisfaction concerns customers' evaluations of whether a product or service meets their needs and expectations (*37*). This evaluation process comprises perception, evaluation, and response, as a result of which, customers find pleasure and well-being when their expectations are met (*38*). However, when their expectations are not fulfilled, this does not necessarily imply dissatisfaction (*39*). A formulation of customer expectations before the interaction with a service is subjective, but the evaluation and perception of the service attributes is an objective process.

Unlike satisfaction, perceptions of QoS result from customers' subjective cognitive processes (*7*). According to Zeithaml et al., customers do not perceive quality unidimensionally; rather, they judge it based on multiple factors (*40*). This process implies a focused evaluation, for example, reflecting perceptions of reliability, assurance, responsiveness, empathy, and tangibles (*41*). As such evaluations are based on momentary perceptions that are subjective, user opinions of QoS are context-dependent and may change over time (*42*). There is a close relationship between customer-perceived QoS and satisfaction (*8*, *27*), and as the satisfaction construct is built on fulfillment of expectations, evaluating the multiple attributes of an expected outcome will not necessarily affect perceptions of satisfaction in a linear relation (*43*).

Furthermore, QoS has been theorized for airports to be, at least partially, a consequence of perceptions of the servicescape (*18*, *36*, *44*). A servicescape corresponds to the physical environment (i.e., sets of amenities) and the quality of its characteristics as mediators of the service. They are a fundamental part of the airport performance assessment (*45*), and these servicescapes are perceived when users directly interact with them. According to the literature, servicescapes influence both QoS and satisfaction (*17*, *18*, *36*). Furthermore, servicescapes appear in the literature as potential explanators of experiences when they are carefully designed and focused on initiating a happy or memorable interaction that results in an enjoyable experience (*44*).

Experience, in this case, is a personal and emotional psychological construction (*46*), geared toward the experience of a memorable event based on the relationship between the user and the service provider (*47*). Unlike user satisfaction, a good experience is based on unexpected services or attributes that not only fulfill the users' previous expectations but go beyond (*48*), for example, something surprising occurs. As Alnawas and Hemsley-Brown point out, experience is highly dependent on the interactions between the user and the physical environment (*48*). Perceptions of an experience with a particular service can change over time as customers become more aware of what to expect (*49*). In this case, a customer may perceive a high degree of satisfaction but not necessarily a memorable experience.

Interestingly, experience has recently become a more studied facet of airport performance analysis. The literature has shown that the experience within an airport can be its "differential advantage" toward capturing passengers, and therefore expenditure should be put in place to enhance the experience (*5*). Despite the complexity of defining the airport-related experience, literature has shown that a good experience goes beyond the traditionally rendered services (e.g., comprehensive information displays or comfortable waiting zones) (*5*, *22*). Furthermore, airport analysis has stressed that memorable experiences are key to influencing loyalty toward the terminal and, therefore, the different stages of experience should be taken into account. Tuchen et al. proposed a framework that explains the different stages of experience and their potential for airport planning (*5*). Their framework establishes that expected experience influences the experience itself. In turn, the experiences in the airport influence the reflective experiences or perceptions about the received experience. These perceptions provide immediate feedback that can contribute to redesigning the delivered experience. Within this framework, it is shown how experience-related perceptions can influence decisions in airport planning.

Liking is an affective response to stimuli in an individual's direct environment (*50*). This response correlates with pleasure (*50*) and with the absence of negative emotions, and corresponds to a behavioral response about a situation, place, or individual (*51*). Liking and a positive affective response to something can also be associated with a prevalence of behaviors associated with something one likes, which, in turn, tends to be repeated in the pursuit of hedonic happiness (*52*). For example, in transportation, liking a specific commuting mode has been found to correlate with the repeated use of that mode (*53*), especially if that mode is biking (*54*). Liking a commuting mode has been found to be associated with commute satisfaction (*55*). However, no studies that included liking as an SI focused on airport evaluations. Despite this, we decided to include it as an SI of the performance or services of terminals based on our findings in the literature. This decision was based on the relationship that there appears to be between liking and behavior prevalence and on the apparent correlation between liking and other SIs.

These SIs are associated with individuals' behaviors and are considered to be predictors of people's behavioral responses to places, activities, and situations (*56*).

In the case of transportation, for example, satisfaction and QoS have been used to forecast user loyalty (*57*) and intention to repurchase and recommend (*58*). In the same field, user experience and liking (as positive attitudes toward the service) have also been found to serve as predictors of behavioral intentions and actual behavior (*59*). In retail research, Yani-de-Soriano and Foxall presented an environmental psychology model (i.e., Mehrabian–Russel model) that evinces the links between these SIs and avoidance–approach behaviors (*51*). This model proposes that three dimensions (i.e., arousal, dominance, and pleasure) account for affective states that indicate a primary emotional response that has an impact on the desire or intention to access and remain in a given place (approach) or the desire or intention to leave it (avoid), hereafter referred as to avoid–approach behaviors. Traditional measures of the three dimensions in the model include responses to service, satisfaction, and liking of a particular environment's stimuli (*60*).

Methods

The fieldwork comprised the in-person administration of a questionnaire to domestic travelers at El Dorado Airport in Bogotá, Colombia, which is the third busiest in Latin America in passenger traffic and the busiest for freight. This is the only commercial airport serving the city of Bogotá and three domestic airlines provide fly to 23 cities in Colombia. The questionnaire inquired into passengers' overall perceptions of the four dependent variables (scored using a 1 to 5 Likert scale) by asking one question per dependent variable. To evaluate satisfaction, the survey asked: "With 1 being 'totally unsatisfied' and 5 'totally satisfied,' please rate your satisfaction with El Dorado Airport's service." For liking, QoS, and experience, the questions were measured in agreement level: "With 1 being 'totally disagree' and 5 'totally agree,' please rate each of the following statements: I like being in the airport / The airport's quality of service is good / My experience while in the airport is good. An extensive list of attributes to explain what was meant by these SIs was presented to each respondent (see Table 1). As the primary objective of the survey was to analyze participants' level of satisfaction with the airport, the satisfaction question was asked first. To avoid anchoring and confirmation biases, the rest of the dependent variables (i.e., liking, QoS, and experience) were mixed in with the questions about attribute perceptions and asked in this block.

Before administering the survey we developed pilot tests to train the five surveyors and to evaluate response times. Furthermore, these tests were developed to identify errors, whether in the wording of the survey or in the administration logic. After correcting for possible errors the survey campaign was launched in the airport. Since we wanted to restrict the survey to typical airport users, we selected a nonholiday period to avoid the seasonal peak effect and decided not to administer the survey on Sundays. The survey was administered between April 25 and May 7, 2018, from 7 a.m. to 9 p.m. (the time frame was a result of airport permits), and yielded 377 valid responses. We randomly chose travelers who were sitting or walking in public areas of the airport before the security points. Surveyors were instructed to approach every third person once the surveying process had begun. After finishing a survey, the surveyors were instructed to once again count three people and then invite the third to participate. If a person declined to participate, the surveyor would count another three people before asking the third to take part.

We also filtered the respondents to guarantee that every participant had undertaken at least one flight through El Dorado Airport in the last 3 years, as being familiar with the terminal was key to participating in the survey. This was done by including filter questions at the beginning of the survey; note that no self-selection was allowed. Each survey lasted approximately 9 min, and the overall response rate was 94.9%. The questionnaire was divided into three sections: screening information, perception attributes and rating of services (on a five-point Likert-type scale), and sociodemographic information.

As shown in Table 1, the selected attributes corresponded to within-building characteristics. These attributes were chosen because we wanted to evaluate the performance of the terminal solely in the trip stages in which users were in direct contact with the infrastructure and services. Check-in and boarding times were included as evaluated attributes, regardless of them being attributes that are associated more with the operator (i.e., the airline) than with the terminal. However, as we were asking about general perceptions of trips made within the past 3 years and not specific traveling experiences, we considered that any related ranking would be attributed to the airport's infrastructure mediating check-ins and boardings rather than to a specific airline's processes. We selected within-building characteristics because environmental psychology suggests that the perceptions of direct contexts influence behavior (*56*). Therefore, we excluded trip stages that are mediated by vehicles (in which case the assessment would have been based on the vehicles rather than the infrastructure), that is, accessing the terminal and taking off. Furthermore, accessing the terminal was not broadly evaluated since this travel stage depends on the infrastructure of both the airport and the local administration, which reduces the action field with regard to any recommendations that might emerge from this study.

Table 1. On-Site Measured Airport User Perceptions with Mean and Standard Deviation Obtained in the Survey

Variable	Statement presented in the survey to be rated	Mean	SD
Rate your level of agreement (1 to 5)			
Order	El Dorado Airport is organized	4.51	0.61
Modernity	For me, it is important that the airport is new	4.53	0.71
Orientation	Currently, I can find my own way around at El Dorado Airport	4.28	0.82
Spaciousness	I feel good if the airport has high ceilings	4.47	0.66
Information on screens	It is difficult for me to find out the status of my flight	3.17	0.52
Distance	Everything is close at El Dorado Airport	3.78	0.77
Temperature	I usually feel cold at El Dorado Airport	3.52	0.77
Availability of ramps	Sometimes I have to lift or carry my luggage when I move around El Dorado Airport	3.44	0.72
Information signs	The signs allow me to navigate without having to ask	4.09	0.82
Competence	When I ask the staff at El Dorado Airport, the information I receive is correct	4.43	0.64
Friendliness	The staff at El Dorado Airport are friendly when I speak to them	4.43	0.64
Illumination	There is enough light at El Dorado Airport	4.45	0.66
Loudspeakers	The announcements made over the loudspeaker are clear at El Dorado Airport	3.90	0.77
Availability of working areas	If necessary, I can find a place to work at El Dorado Airport	3.81	0.77
Rate the following items (1 to 5)			
Cleanliness	The cleanliness at El Dorado Airport	4.59	0.58
User information	The information at El Dorado Airport	4.43	0.69
Security	The security at El Dorado Airport	4.63	0.58
Availability of ATMs	The availability of ATMs at El Dorado Airport	4.22	0.73
Availability of WC	The availability of bathrooms at El Dorado Airport	4.50	0.74
Availability of restaurants	The availability of restaurants at El Dorado Airport	4.44	0.73
Availability of chairs (waiting areas)	The availability of seats in the waiting areas at El Dorado Airport (after security screening)	3.94	0.87
Availability of chairs (public areas)	The availability of seats in the waiting areas at El Dorado Airport (before security screening)	3.72	0.83
Rate your satisfaction with the following times (1 to 5)			
Check-in time	Flight check-in and baggage drop-off	4.12	0.81
Security time	Going through the security screening	4.21	0.76
Boarding time	Boarding the airplane	4.27	0.79

Note: ATM = automated teller machine; SD = standard deviation; WC = toilet.

The richness of any analysis is a function of the number of detailed attributes used as regressors, which would be lost by conducting a dimensional reduction of regressors. However, we did group the regressor variables (x_i) into categories. Instead of using factor analysis to create fewer new variables, we used exploratory factor analysis (EFA) to decide which variables fell into a given category. EFA was used as a guide to visualize the correspondence between the attributes and categories, but we did not interpret the factors or include them in the modeling process. Therefore, we do not explain the model or its specifications and only used this methodology to sketch a basic proposal for the categories that will be analyzed in further research. In sum, EFA helped us to propose the analytical categories to qualitatively analyze our results. As a result, the regressors were grouped into seven analytical categories: C1-Time, C2-Infrastructure, C3-Amenities, C4-Staff, C5-Information, C6-Environment, and C7-Services. These categories were not included in further statistical analyses but were incorporated only as means to interpret and discuss our results. Finally, to assess user ratings of satisfaction (SI1), experience (SI2), liking (SI3), and QoS (SI4), we collapsed Responses 1, 2, and 3 into one category after realizing that variable responses were predominantly grouped within Responses 3, 4, and 5 (see Table 2), which helped to increase the goodness of fit of the models to be described.

Our first analysis tested the correlation among the four SIs based on Pearson and Spearman correlation indicators. Pearson's was used because it describes linear relationships, whereas Spearman's computes monotonic relationships (*61*). We then performed linear regression

Table 2. Distribution of the Responses Obtained for each Service Indicator (SI)

Rating scale	Satisfaction (SI1)	Experience (SI2)	Liking (SI3)	Quality of service (SI4)
1	0	1	1	2
2	0	2	3	7
3	25	27	15	14
4	153	165	169	175
5	199	182	189	179
Total	377	377	377	377

(ordinary least squares; OLS) models to identify the significant regressor variables explaining each SI. We used OLS instead of ordered models because the responses were captured from numeric options that could be considered an interval scale (*62*).

Four linear regression models were developed, one for each SI, using the same regressor variables (see Table 2). The initial analysis dealt with comparing models and identifying which variables were significant regressors to explain each SI. Using linear regression in numeric Likert-type scales proved to be methodologically suitable (*63*)

Equation 1 presents the linear multivariable model equation, where parameters β_1, β_2, ..., β_n are regression coefficients associated with each variable $X_1, X_2, \ldots, X_n$; β_0 is the intercept parameter; and ε is the random error. Linear models consist of calibrating the values of the β_i parameters in such a way that the highest possible proportion of the Y variable's variance is explained. Thus, linear regression is given by a weighted sum of X values as shown in Equation 1 (*64*),

$$Y = \beta_0 + \beta_1 X_1 + \ \ldots \ + \ \beta_n X_n + \varepsilon \qquad (1)$$

The significance of the four models (i.e., one per SI) was assessed using the p-value corresponding to each coefficient of each independent variable. To define how well the calibrated models performed, we chose the coefficient of determination (R^2) and lack of fit F-test as performance indicators.

Results and Analysis

The respondents of the survey were younger, wealthier, and better educated than the average population of Bogotá. Most of the respondents can be characterized as young females traveling from El Dorado Airport. Table 3 shows that the majority answering the survey were passengers beginning their trip from El Dorado. The vast majority were Colombians with high incomes. In Bogotá, for example, the percentage of people earning more than US$1,137 a month is about 12% (*65*), whereas in the survey, the percentage in this category of earnings proved to be over 50%. Strata, as a proxy of income, showed a somewhat similar pattern: the wealthier strata in Bogotá (i.e., 4, 5, and 6) compose

Table 3. Respondent Sample Distribution

Category	*N*	Percentage
Trip status		
Passenger	268	71.09
Companion	109	28.91
Work-related flights		
Never or rarely	196	51.99
Once or twice per year	52	13.79
More than twice per year	129	34.22
Recreative flights		
Never or rarely	73	19.36
Once or twice per year	189	50.13
More than twice per year	115	30.50
Stage of the trip		
Arriving at the airport	53	14.06
Departing from the airport	157	41.64
Connecting	58	15.38
Companion	109	28.91
Reduced mobility		
No reduced mobility	362	96.28
Reduced mobility	14	3.72
Nationality		
Colombian	348	92.31
Other nationality	29	7.69
Gender		
Female	251	66.58
Male	126	33.42
Age group		
18–39	238	63.13
40–59	104	27.59
60 or more	35	9.28
Income (monthly)		
Less than US$182 or dependent	25	6.63
US$183–1,137	140	37.14
More than US$1,137	212	56.23
Stratum[1]		
1	9	2.39
2	39	10.34
3	126	33.42
4	104	27.59
5	38	10.08
6	11	2.92
Other/do not report	50	13.26
Education		
Elementary	6	1.59
High school	64	16.98
Technical and vocational	64	16.98
Undergraduate	161	42.71
Postgraduate	82	21.75
Access/egress mode		
Private	95	25.20
Taxicab or apps	107	28.38
Transit	91	24.14
Connecting	83	22.02
Do not report	1	0.27

[1]The stratum corresponds to a socioeconomic categorization assigned by the local administration and is correlated with income (*66*).

Table 4. Correlation Tests of the Four Service Indicators

Service indicator (SI)	Mean (μ)	SD (σ)	Pearson's *r* coefficient				Spearman's rank			
			SI1	SI2	SI3	SI4	SI1	SI2	SI3	SI4
SI1-Satisfaction	4.46	0.62	1	0.24	0.27	0.29	1	0.22	0.23	0.26
SI2-Experience	4.40	0.63	0.24	1	0.58	0.53	0.22	1	0.59	0.56
SI3-Liking	4.45	0.59	0.27	0.58	1	0.59	0.23	0.59	1	0.61
SI4-QoS	4.41	0.60	0.29	0.53	0.59	1	0.26	0.56	0.61	1

Note: QoS = quality of service; SD = standard deviation.

15% of the population, whereas for the surveyed sample, these higher strata represented around 40%. In relation to scholarly accomplishment, undergraduate and postgraduate education accounted for almost 60% of the surveyed sample. The same educational levels comprise 25% of people in Bogotá (*65*). As expected, wealthier people appear to travel by air more than the general population.

In general, ratings of the airport attributes were good. As shown in Tables 1 and 4 both performance indicators and explanatory variables were highly rated by El Dorado users. In Colombia, typical grading systems go from 1 to 5 with 3 being the passing grade. This implies that El Dorado Airport received a "passing grade" in all the variables evaluated. Interestingly, the variables with the lowest ratings were those that asked about negative perceptions (e.g., "It is difficult for me to find out the status of my flight"−3.17; "I usually feel cold at El Dorado Airport"−3.52; "Sometimes I have to lift or carry my luggage when I move around El Dorado Airport"−3.44). Therefore, the overall airport ratings seemed to be consistently associated with positive valuations.

The correlation among the four SIs provided the initial clues to their similarities and differences. We analyzed both the linear- (Pearson's correlation) and the monotonic relationships (Spearman's correlation). Despite the lack of agreement in the literature on the thresholds of correlation indicators when determining whether two variables can be considered to be strongly correlated or not (*67*), the results showed that all four dependent variables were positively correlated with each other (Table 4). We found a strong correlation (>0.50) between SI2-Experience, SI3-Liking, and SI4-QoS, with SI3–SI4 being the strongest. Conversely, SI1-Satisfaction was moderately associated (<0.30) with the other three variables. These results were consistent for the two correlation method analyses.

A strong correlation among some of the SIs does not imply that they have the same roots or explanatory variables. Although a high positive correlation was found between three of the four SIs, when performing linear regressions and comparing the models obtained, we found that all four SIs were explained by different categories of regressor- and independent variables (see Table 5). This finding provided evidence that SIs can be different in essence, despite their strong correlations. Analyzing the regressors that significantly explained each SI provided information on how regressor variables and their related categories represented different facets of individual perceptions of infrastructure. For each independent variable, the significance of the coefficients in the linear regression (presented in parentheses after the coefficient value in Table 5) indicated the contribution to the given dependent variable (SI1, SI2, SI3, or SI4). For coeffects with no extra information next to the coefficient, we cannot claim that the coefficient was different from zero at a confidence level of 90%, meaning that its contribution to the regression was not significant.

For air travelers using the airport terminal, perceptions of the infrastructure supply or conditions (C2) appeared to be significant in all SIs. Infrastructure (C2) was the only category that had at least one significant regressor variable explaining all the SIs. Furthermore, the overall perception of "order" in the terminal was the only significant regressor for all the SIs and had the highest contribution for C2. Nonetheless, the perception of "spaciousness" also seemed to be relevant for users when reviewing SI2-Experience, SI3-Liking, and SI4-QoS. C1-Time only appeared as a relevant group for SI2 Experience, but it had a low impact on the overall SI, as other categories contained variables with greater significance for the air travelers' experience.

The group of variables associated with staff (C4) included at least one significant regressor in three of the four SIs (i.e., SI2-Experience, SI3-Liking, and SI4-QoS). In each of these models, the variable in C4 had the highest coefficient, and thus, made the greatest contribution. It is not by chance that the three variables that were highly correlated to each other were similar in that they had staff-related variables explaining the SI. One difference was that staff competence appeared to be significant for SI3-Liking and SI4-QoS, whereas staff friendliness appeared to be significant in SI2-Experience. Thus SI2-Experience could serve as an indicator of elements that

Table 5. Linear Models

Regressor variable	Estimate (significance)			
	SI1-Satisfaction	SI2-Experience	SI3-Liking	SI4-Quality of service
Intercept	1.951 (***)	−0.148	−0.073	0.108
C1-Time				
Security time	0.006	**0.086 (.)**	0.013	0.041
Boarding time	−0.043	**0.07**	−0.014	−0.024
Check-in time	0.036	**−0.006**	−0.054	−0.032
C2-Infrastructure				
Order	**0.115 (*)**	**0.11 (*)**	**0.19 (***)**	**0.198 (***)**
Spaciousness	**−0.022**	**0.106 (*)**	**0.107 (*)**	**0.122 (**)**
Orientation	**0.006**	**−0.009**	**0.052**	**−0.002**
Distance	**0.04**	**0.052**	**0.05**	**0.049**
Modernity	**0.002**	**0.01**	**0.095 (*)**	**−0.026**
C3-Amenities				
Availability of chairs (waiting areas)	0.068	**0.051**	**0.073 (*)**	0.05
Availability of chairs (public areas)	0.047	**−0.028**	**−0.045**	−0.004
Availability of ramps	−0.031	**0.073 (.)**	**0.01**	0.049
C4-Staff				
Competence	−0.125	**−0.008**	**0.181 (**)**	**0.222 (***)**
Friendliness	0.067	**0.263 (***)**	**−0.013**	**0.074**
C5-Information				
User information	**0.209 (***)**	−0.041	−0.045	**0.123 (**)**
Loudspeakers	**−0.023**	0.019	0.054	**−0.018**
Information on screens	**0.104 (.)**	−0.019	0.042	**0.002**
C6-Environment				
Illumination	**−0.049**	**0.019**	**0.057**	0.005
Information signs	**−0.038**	**0.07 (.)**	**0.04**	0.019
Temperature	**0.123 (*)**	**0.162 (**)**	**0.102 (*)**	0.071
C7-Services				
Availability of restaurants	−0.026	**−0.009**	**0.087 (*)**	**−0.05**
Availability of WC	−0.043	**−0.045**	**−0.048**	**0.001**
Security	0.081	**0.066**	**0.044**	**0.013**
Cleanliness	0.069	**0.003**	**−0.001**	**−0.017**
Availability of ATMs	0.011	**−0.005**	**0.004**	**0.052**
Availability of working areas	0.008	**0.087 (*)**	**0.082 (*)**	**0.089 (*)**
Residual standard error	0.580 on 351 df	0.508 on 351 df	0.465 on 351 df	0.471 on 351 df
R^2	0.177	0.399	0.423	0.434
Adjusted R^2	0.118	0.356	0.382	0.394
F-statistic	3.018 on 25 and 351 df	9.305 on 25 and 351 df	10.29 on 25 and 351 df	10.77 on 25 and 351 df

Note: ATM = automated teller machine; SI = service indicator; WC = toilet.
Sets of variables with one or more significant variables in **bold.**
Significance level: *0.1 < $p \leq 0.05$; **0.05 ≤ 0.01; *** < 0.01.

induce comfort, whereas SI3-Liking and SI4-QoS were more strongly influenced by variables that assess performance.

Categories C3-Amenities and C5-Information affected different SIs. In the case of C3, the availability of ramps and chairs were the variables with the greatest significance and seemed to be perceived by users as complementary to basic services when analyzing SI2-Experience and SI3-Liking, respectively. On the other hand, when reviewing SI1-Satisfaction and SI4-QoS, variables in the C3-Amenities group had a low overall impact on the SI because C5-Information took precedence. User information (C5) presented the greatest significance within the category for both SI1 and SI4, meaning that air travelers contemplated information signage, clear directions, and flight status information when assessing satisfaction and QoS.

The two remaining groups were C6-Environment and C7-Services. Temperature (C6) was a significant variable for SI1-Satisfaction, SI2-Experience, and SI3-Liking, demonstrating that a comfortable temperature was relevant for air travelers inside the terminal. Additionally, for the three correlated SIs (SI2-Experience, SI3-Liking, and SI4-QoS), the working area (C7) regressor was found to

be significant, meaning that users appreciated the availability of areas or elements that allowed them to perform activities that are not strictly associated with an airport.

Discussion

Airports "compete" with each other to enhance the attraction and retention of both passengers and airlines (*68*); therefore, resources have been allocated to boost their attractiveness (*1*). Application of user-oriented tools, such as customer surveys, serves to build on our understanding of tangible and intangible factors that might affect how services rendered by the infrastructure are perceived. As suggested for other modes of transportation, people's direct interaction in a given environment influences user perceptions, and assessing such perceptions leads to a better understanding of how to develop an attractive or approachable place (*56*, *69*), where people actually enjoy spending time. Furthermore, such tools rely on perceptions being much more powerful in explaining a service proxy than objective measures are (*70*).

We found that, in essence, the four studied SIs had a different root, despite the high correlation among three of the four SIs and notwithstanding statistically obtaining the same average for all four SIs when evaluating the airport terminal. Thus, each SI may not necessarily be the same as or equivalent to the others, and each was explained by different perceptional variables, falling into different service categories. Satisfaction (SI1) in particular appeared to be the most dissimilar from the other three SIs, not only because of its lower correlation with them but also because it had the fewest significant regressors and the lowest explanatory power (i.e., adj-$R^2 = 0.118$). We found liking (SI3) and experience (SI2) to be very similar (but not equivalent), both showing a high correlation and similar categories with significant regressors. Liking is an experiential affective judgment, like pleasantness (*50*), whereas experience is a vivid sensorial process (*48*). Finally, QoS (SI4), which was the closest to the traditional LOS, related more to the rational evaluation of features, elements, or quality attributes of the service received. These service-related indicators (e.g., LOS or QoS) have been broadly presented in the literature and are different in essence from experience and liking in the sense that the latter two are emotional or affective variables, whereas QoS is associated with a cognitive, more rational evaluation. Nonetheless, in both affective and cognitive evaluations, the beginning of the assessment is based on sensory interactions with the context. More specifically, memorability is associated with experience and focuses on permanent responses to the environment, whereas liking is related to temporary (almost immediate) responses to stimuli.

As QoS was the most frequently used SI, it deserves special attention in the discussion. First, recall its power in assessing tangible goods and services; for instance, unlike the other three SIs, not a single environmental attribute (C6) was found to be significant in explaining SI4 (QoS). This supports what Brady and Cronin posited: "Customers infer quality based on their perceptions of the physical facilities" (*41*). QoS was also based on the functionality of the infrastructure rather than users' emotional perceptions, which corresponds to the final phase of customization, according to Pine and Gilmore (*20*). That the QoS model (SI4) presented the best goodness of fit (adj-$R^2 = 0.39$, F-statistic = 10.330) could be the result of the number of regressors we acquired from the literature, in which QoS was the most common SI.

Satisfaction was least similar to the other SIs, and the SI that the regressors could explain the least. We found two reasons for this. Methodologically speaking, we requested that travelers assessed the attributes at a given moment—we did not ask them about their expectations for the assessed attributes. Satisfaction is a process that relies on comparing the expected versus the received service, producing emotional, affective, and behavioral responses (*71*). In this sense, measuring perceived satisfaction should be related to expectations in several dimensions. As stated by Machado-León et al., "it requires a thorough diagnosis of the services provided based on user perceptions and expectations, and thus, it is important to measure the contrast between both variables" (*72*). The second reason for the dissimilarity (conceptual) is that the causal relationship between QoS and satisfaction has been reported in the literature, meaning that the SIs might not be at the same level. In fact, when using QoS (SI4) as a regressor for satisfaction (SI1), the goodness of fit and the model's power to explain variance increased by over 20%.

In relation to experience, Pine and Gilmore, who studied this variable as an "economic delivery," found that the reward given by a memorable experience comprises both an individual and internal sense of engagement with the offering (i.e., in this case, with the terminal) (*20*). According to Mehrabian and Russell, perceptions of places (that can be related to the evaluated SIs) were associated with emotional responses (*60*). These responses, in the presence of positive word-of-mouth advertising, can explain approaching behaviors toward places (*56*). Accordingly, Pine and Gilmore found that the attributes that most affect experience are those related to sensations and uniqueness rather than the performance and features of the service or product itself (i.e., travel) (*20*). Therefore, SI2-Experience at El Dorado Airport was mainly explained by variables associated with consumption of the location as a setting, rather than as a functional product or good.

Recognizing that El Dorado has recently been renovated, providing modern spaces, enhanced waiting areas, and the availability of restaurants showed that SI2-Experience and SI3-Liking were indeed similar SIs, but SI2-Experience was more closely related to attributes that go beyond the minimum elements a terminal should provide (e.g., information and on-time service). The internal design of air terminals can influence staying (approaching) or leaving (avoiding) behaviors. Wanting or feeling attracted to remain in a given place for extended periods can lead to greater engagement in the activities there and even in buying more. The latter has been explained in a study by Yani-de-Soriano and Foxall (*51*).

Purposely designing terminal spaces according to specific criteria and offering distinctive features can enhance "approaching" behaviors, as proposed in the literature (*56*, *60*). In turn, these approaching behaviors can increase the intention to travel from/to these terminals, which, in turn, can be increased by word-of-mouth marketing. This is beneficial for airports as it can increase their income from nontransportation revenue, as passengers spend money at airports on shopping, parking, and food. This nontransportation revenue can constitute a highly significant proportion of total airport revenue. As shown in our literature review, revenue produced by restaurants and sales in stores can be used to cover infrastructure maintenance. Furthermore, approach behaviors should be promoted by understanding the SIs and attributes that influence them, a suggestion that could lead to more engagement in both lingering and buying behaviors. On the other hand, negatively affecting these SIs can cause avoidance behaviors (*56*), which implies diminished purchasing opportunities and future avoidance of specific airports for transfer. Creating spaces that enhance and increase SI evaluations by users (such as the more experiential or customizable ones) would maximize customization; that is, this would take service delivery to a memorable level, in which the individuals' state of mind is influenced by their context and the sensations emerging while experiencing the space.

The current research also provides some practical implications. The most important is related to the rise in awareness and the effects of using one or another SI. In an overall evaluation of the airport as the target, average perceptions of any of the presented SIs to a random sample could provide sufficient information. However, depending on the airport's goals and targets, understanding the root and essence of each SI will be important. For example, if the target is to make spaces "approachable" under environmental psychology theory, asking about satisfaction would be the chosen proxy to compute and evaluate. Asking about people's experiences could help to meet goals related to enhancing the time spent in the terminal, whereas focusing on liking would be critical to meeting goals related to understanding specific attributes that go beyond expectations and relate more to buying.

Conclusions

This study provides valuable insights into the similarities and differences between four service-like indicators in airport terminals, namely satisfaction, experience, liking, and QoS, based on perception surveys. When analyzing predictors that explained the SIs, we found that each was unique and nowhere near equivalent. This research also proposed that different SIs can be assessed to promote airport terminal enhancements from the perspective of how they are experienced. Despite the high correlation and the statistically equal averages of all four SIs, this study has provided evidence that diverse attributes affect each of them, meaning that each one is relevant and evinces different facets of user perceptions of the terminal. These perceptions are associated with future- or postpurchase behaviors, by which each one could potentially increase the airport's revenue.

Opportunities for further research on the subject are manifold. First, it would be interesting to replicate this study in other airports worldwide to consolidate a generalized structure of SI analysis. To do so, ideally the same SIs and instrument structure as presented here would be retained. Furthermore, it would be desirable to collect information about the destination (recall that our data were obtained only from travelers within national borders). In relation to the analyses, the instruments could also include post-use experience and -behaviors to understand the effects of the SIs on preferring and recommending specific terminals.

In undertaking this research, it is important to highlight that certain aspects require attention, methodologically. Linear regressions were used in this study because we wanted to test the relationships between each predictor and different outcome variables. However, the characteristics of the variables violated some key assumptions of linear regression theory and that needs to be considered in further research. First, the nonnormal distribution of variables can affect a model's convergence. To overcome this, the literature proposes the use of longer rating scales when evaluating each variable, for example 0 to 10 (*62*, *73*), or transforming the variables (e.g., Box–Cox transformations). Secondly, it would be advisable to validate the model using ordered probit approaches to verify inconsistencies among the results. Ordered probit is used to model categorically ordered outcome variables, which, in our case, showed consistent estimators and significances. Thirdly, evaluating the normality in the distribution of residuals would be necessary in analyzing the models' results. Finally, recall that this is an exploratory study that is in the process of enhancement. We have

presented the basis for orienting and developing structural equation modeling, assessing the different SIs and their relationships. Since the collected data are mostly subjective, a better approach would be to use latent variable-based structural equation modeling (*74*).

Since this research used prepandemic data, further research should take into account the COVID-19-related circumstances when analyzing the SIs. The situations derived from the pandemic have influenced traveling across all modes (e.g., Tuchen et al. [*5*], Vallejo-Borda et al. [*75*], and Bucsky [*76*]) and perceptions about transport infrastructure have logically changed in line with the restrictions and measures (*77*). Therefore, perceptions of the SIs should be recalibrated under these new circumstances because the expectations of users have probably changed and new attributes might appear relevant in light of future pandemics (e.g., availability of disinfection points, -of medic response, or of space for social distancing). COVID-19 also brought a financial crisis for both airlines and airports. Future research, based on understanding travelers' priorities related to healthcare could provide information on terminals' competitiveness under pandemic circumstances. This would yield not only a way to curtail the financial crisis but preparedness for future scenarios such as the one that occurred in 2020 and 2021.

Further research could also be developed in the seven categories proposed by this study. Having consensus on these attribute categories would be helpful for comparisons and benchmarking, identifying which factors carry more weight given the airports' performance objectives (service, liking, experience, satisfaction). Furthermore, treating these factors as latent variables brings about the opportunity to further analyze the structural relationships between the different variables and generalize a "perceptions–SIs–behaviors" framework.

This study exemplifies the relevance of integrating and understanding user perceptions as a powerful source of information to evaluate transportation infrastructure and service, as has recently been shown in the literature (*70*, *78*, *79*). However, a direct interpretation of the attributes' ratings and an intuitive association with an SI can be misleading (*63*), and therefore, more robust analyses should be developed. To do so, modeling techniques including probabilistic methods and/or structural equation modeling could be beneficial to more accurately identify the magnitude and direction of the explanatory relationships between independent variables and SIs. Analyzing the structural relationships between SIs appears to be an adequate step toward further research as the literature has shown that significant relationships exist among our proposed SIs (*80*). Developing these analyses could provide information on how users perceive the customization process, and how to enhance such a process considering the users' input.

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Author Contributions

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