Exploring multi-quality attributes of airports and the asymmetric effects on air traveller satisfaction: The case of Thai International Airports

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Abstract

Using the Thai international airports as a selected context, the purpose of this study is twofold. First, to examine the asymmetric effect of airport quality attributes in the airport terminal on passenger satisfaction from the perspective of Thai travellers. Second, to prioritise the attributes into categories on the basis of impact–range performance analysis (IRPA) and impact asymmetry analysis (IAA). An online survey (n = 879) was conducted via convenience and snowball sampling. The findings indicate that an airport has multiple attributes that yield dynamic effects on air traveller satisfaction. In addition, IRPA and IAA enable researchers and industry practitioners to classify these attributes into five categories, namely frustrator, dissatisfier, hybrid, satisfier and delighter. The findings also suggest that seven out of ten attributional domains, derived from the selected Thai international airports, reflect both asymmetric and symmetric characteristics, whilst only three domains namely flight information screen, passenger facilities and immigration show only asymmetric effect, mainly on the positive side. The theoretical and practical implications of this study are discussed.

Keywords: Airport, Quality, Attributes, Satisfaction, Asymmetry, Non-Linear

1. Introduction

Airports have persistently played a significant role in the tourism and air transport industry by connecting people to cities, countries and continents (Graham et al., 2019) and projecting the first and last images of a destination to air travellers (Martin-Cejas, 2006; Nghiem-Phu & Suter, 2018). Since the start of deregulation of the airline industry in the 1970s, airports have evolved from bare-bone transportation centres serving mainly functional–utilitarian purposes, to essential and experiential bustling hubs for millions of air travellers so that they can have a better experience whilst travelling. Consequently, airports can generate non-aeronautical revenues from many commercial activities that are provided to air passengers within the airport environment, such as food and beverages, shops, entertainment and car parking (Graham, 2014).

Although many key international airports have deployed a business philosophy and enhanced the importance of airline passengers by focusing on improving passenger satisfaction and promoting the passenger experience (Wattanacharoensil et al., 2017), various issues, particularly those associated with the poor performance of airport attributes, still exist (Hong et al., 2020). Industry surveys have revealed that passengers continue to struggle from certain experiences at airports (particularly associated with security screening and border control/immigration) and regard these as key pain points for air travel (Garcia, 2017). More evidence also shows that air travellers visiting airports in major cities have frequently suffered from long immigration queues, disorganised security check points (Chayutvorakan, 2017) and uninformative ground staff (Fox, 2015). As a result, passengers have demanded to have a better experience with less waiting time, more control of the processes (via technology) and to receive updated information about their flights (IATA, 2019).

Airports in Thailand are with no exception. In view of this, Thailand has 11 international airports, managed and operated by three key different parties namely 1) Airport of Thailand (AOT) - the state enterprise 2) Bangkok Airways Public Company Limited – a private company and 3) Department of Airport - a Thai government department under the Ministry of Transport. AOT manages and operates six key international airports of the kingdom, namely Suvarnabhumi Airport (BKK), Don Mueang International Airport (DMK), Phuket International Airport (HKT), Chiang Mai International Airport (CNX), Mae Fah Luang-Chiang Rai International Airport (CEI), and Hat Yai International Airport (HDY). Bangkok Airways manages and operates Samui International Airport (USM). Department of Airport manages and operates Krabi International Airport (KBV), Surat Thani International Airport (URT), Udon Thani International Airport (UTH) and U-Tapao International Airport (UTP) (UTP is the only airport owned by Royal Thai Navy). Most of these aforementioned international airports in Thailand, receive pressures from air travellers, reflected from passenger comments appearing in the Skytrax Airport Reviews website (see Skytrax Airport Reviews, 2020) and strive to achieve a good level of service performance within the airport terminals. Appendix 1 shows the figurative details of the selected key international airports in Thailand, managed by AOT, as they are the largest contributions in passenger traffics.

Improving service quality performance to enhance passenger satisfaction, and creating a better experience at airports, has been amongst the key priorities for airport managers, especially since good airport service quality and passenger satisfaction influences word-of-mouth and revisit intention (Liu & Lee, 2016; Prentice & Kadan, 2019), and increases the potential for non-aeronautical revenue generation. However, previous research in service management has shown that even if a business provides good service quality with certain service attributes, this does not necessarily guarantee customer satisfaction (Kano, 1984), as service attributes can influence customer satisfaction in different ways (Pratt et al., 2020). According to attraction quality theory (Kano, 1984) and three-factor theory (Oliver, 1997), different attributes pose various perceived value to customers. Some attributes may cause dissatisfaction if not provided, whereas they may not induce satisfaction even when supplied. Conversely some attributes can induce customer delight when being supplied but will not create any dissatisfaction if they are not provided (see also Lee & Choi, 2019; Lee et al., 2020). If they are not aware of this asymmetric relationship, service providers who aim to satisfy customers may eventually use resources unnecessarily, especially as maintaining cost levels is a difficult task for the airport industry. However, since the application of attraction quality and three-factor theories is limited in the airport literature, it may not be wrong to infer that airport managers do actually face the challenges of not knowing what attributes can induce customer satisfaction, and what attributes must be provided to avoid dissatisfaction. Evidence of the differential impact of quality attributes on customer satisfaction cannot be captured by linear and symmetric effects between attributes and satisfaction (see Jin, Park & Yu, 2019; Lee & Choi, 2019; Lee et al., 2020), which is covered in most quality–customer satisfaction–loyalty literature (Prentice & Loureiro, 2017). Therefore, asymmetric analysis to unearth these notions is required which has provided the motivation for this research.

As claimed by previous scholars (e.g. Ju et al., 2019; Kano, 1984; Lee et al., 2020; Mikulic & Prebezac, 2011), the asymmetric analysis of quality attribute effects on customer satisfaction can provide better insights into the dynamic nature of attributes that symmetric linear impacts cannot

recognise. Therefore, exploring the differential impacts of airport attributes on air traveller satisfaction can allow airport authorities and relevant business suppliers to monitor attribute–performance and gain insights into the improvement of attributes when developing strategic plans.

In summary, this study aims to identify the asymmetric effects of quality attributes in the airport terminal on air traveller satisfaction. To achieve such research aim, the study is undertaken by firstly establishing a comprehensive scale of multi-quality attributes for airports using qualitative and quantitative procedures, and then examining the asymmetric effect of airport quality attributes on the basis of impact–range performance analysis (IRPA) and impact asymmetry analysis (IAA), before prioritising the attributes level.

The rest of the paper is structured as follows: the literature on quality attributes of airports, together with the theory of asymmetric effects of quality attributes on satisfaction are reviewed in section 2. In section 3, the research methodology is presented. Section 4 provides the results. Section 5 discusses theoretical and managerial implications based on the results. Finally, research limitations and recommendations are presented in section 6.

2. Literature review

2.1 Key quality attributes of airports

Airports function as a service organisation by providing travel-related products or services to a wide range of air travellers (Bezerra & Gomes, 2016). According to Dodds, Monroe and Grewal (1991), customers typically evaluate quality by considering the attribute performance of a product or service. Hence an air traveller's perceived quality is reliant on the performance of attributes under the control and management of an airport authority.

Academics and practitioners have increasingly paid attention to airport quality, particularly in relation to attributes perceived by air travellers, because of the close association with air traveller satisfaction (Hong et al., 2020), operational performance measurement and non-aeronautical revenue (Bezerra & Gomes, 2016). Previous studies have generally focused on identifying and aggregating airport quality attributes into broad service aspects which vary between studies (Trischler & Lohmann, 2018). For instance, Fodness and Murray (2007) used three dimensions, namely interaction, function and diversion, while Pantouvakis and Renzi (2016) categorised airport quality into servicescape and image, signage and services. Recently, Trischler and Lohmann (2018) examined airport quality indicators of passenger-related services and facilities using the critical analysis method and found eight underlying dimensions, namely check-in, information, immigration, baggage, gate lounges, security, aerobridges and amenities. As no consensus still exists regarding definitions of airport quality attributes and appropriate scales to measure airport quality (Trischler & Lohmann, 2018), this study first carries out an analysis of the potential quality domains of airports on the basis of the available airport literature. These domains include airport signage and layout, terminal environment, check-in, security, passenger facilities, immigration, departure area, baggage, and leisure and entertainment.

Information and signage are considered vital for the perception of quality at an airport (Brida et al., 2016). Signage and wayfinding must be visible and clearly displayed to direct passengers to the

airport services or facilities. Although innovative tools, such as mobile applications, have emerged as alternative channels for passengers to acquire airport information, not all passengers are familiar with these technologies. Thus, screens and signages remain important elements to communicate to passengers when they visit an airport (Brida et al., 2016).

Impressions of air travellers can be positively enhanced when they encounter an appropriate and pleasant service environment (Bogicevic et al., 2016). The level of service that passengers receive during check-in, immigration and security checks can form notable experiences and influence overall trip satisfaction (Brida et al., 2016; Trischler & Lohmann, 2018). An airport that develops efficient processes providing minimal waiting time, and has effective and courteous staff available, particularly in primary service areas (e.g. check in, immigration and security), can contribute towards satisfactory experiences for the traveller (Bogicevic et al., 2016).

The terminal physical environment (e.g. temperature, announcement levels, cleanliness of facilities, lighting and aroma) is also a key feature that contributes to the pleasure/displeasure of air travellers (Brida et al., 2016; Prentice & Kadan, 2019). When environmental elements of a terminal are not perceived as satisfactory, the quality of the experience for air travellers is likely to be reduced, thereby giving a negative perception of an airport.

Basic facilities (such as washroom, wireless internet, restaurants and retail stores) are another attribute that influences the traveller's perceived quality of an airport (Bezerra & Gomes, 2016; Prentice & Kadan, 2019). Air travellers will want clean and sufficient washrooms, and tend to prefer a choice of eating outlets and high-quality retail stores. Thus, attributes under this dimension are conducive to a satisfactory airport experience (Prentice & Kadan, 2019). In addition to the abovementioned attributes, leisure and entertainment plays a supporting role in enhancing the airport experience of passengers (Park & Park, 2018) and is generally perceived as a value-added element by airport managers. Attractiveness, as characterised by an aesthetic feature (i.e. the interior and exterior design of airport facilities), and also events and exhibitions, have additionally been regarded as important elements that provide positive and long-lasting experiences for air travellers (Park & Park, 2018).

2.2 The underlying theory of asymmetric effects of quality attributes on satisfaction

Customer satisfaction is conceptualised as a feeling of pleasure/displeasure resulting from a customer's perception of service performance compared with their expectation (Oliver, 1981). When the performance of a product or service outperforms expectation, a positive disconfirmation arises; if not, the disconfirmation is negative (Oliver, 1981). Although a number of studies have examined key attributes influencing airport satisfaction (e.g. Hong et al., 2020; Seetanah et al., 2020; Van Oel & Van den Berkhof, 2013), an analysis of the asymmetric effects of quality attributes on airport satisfaction tends to be overlooked. As mentioned by Streukens and Ruyter (2004), discarding the asymmetric relationships between attributes and satisfaction may cause a weak predictive power and misspecification of a model.

In the previous airport service quality literatures, different methodological approaches have been used to analyse various aspects of airport attributes, but only a very small number applying the asymmetric effect for the airport analysis and evaluation (see the latest example of asymmetric

analysis from Tseng, 2020). Against this backdrop, the selected attributes in the airport service quality research have been derived from different keys sources and applied various methodologies. The four key sources comprise 1) by the adapted attributes from the SERVQUAL model (Parasuraman, Zeithaml and Barry, 1985); 2) the available 34 airport service quality attributes (ASQ) introduced by Airport Council International (ACI); 3) from the rich qualitative passenger interviews and observations (see Fodness and Murray, 2007); and 4) from the passenger review comments/websites (see see Skytrax Airport Reviews, 2020). Different sources of attributes could lead to different methodological analysis being employed in understanding the airport service quality and passenger satisfaction in the different contexts. For airport service attributes derived from sources 1) and 2), the quantitative analyses are often used through regression/logistic regression (see for example Eboli & Mazzulla, 2009; Bezerra & Gomes, 2015) Structural Equation Modelling (see Fordness & Murry, 2007; Jeon & Kim, 2012;) and/or mathematical fuzzy models (see Kayapinar & Erginel, 2019) to analyse the airport service quality. Some of the previous research also take on the airport quality attributes from source 3); and with the current era of big data and the capability of conducting sentiment analysis, the large data source of passenger reviews have also been employed in the airport study (Bogicevic, Yan, Bilgihan, & Bujisic, 2013; Gitto & Mancuso, 2017). Whilst these current approaches allow academic audiences to have insights on the necessary attributes and dimensions that lead to airport service quality performance and passenger satisfaction, they may not be able to fully unearth the dynamic natures of airport attributes and identify different degrees of passenger satisfaction in accordance to the dynamic quality attributes within the airport. This is the reason that this current research employs the asymmetric effect into the analysis, even though the results will not be fully standardised due to the different perceptions of passengers towards specific airport context.

The effects of quality attributes on overall satisfaction differ between types of attributes (Back, 2012; Kano, 1984; Mittal et al., 1998; Oliver, 1981). These notions are originally supported by Herzberg, Mausner and Snyderman's (1959) two-factor theory, which emphasises particular attributes (i.e. motivators and hygiene factors) that cause differential impacts on employees' job satisfaction/dissatisfaction. Although motivators (e.g. challenging work) enhance job satisfaction, missing hygiene dimensions (e.g. job security) lead to job dissatisfaction and do not increase job satisfaction even if they are well managed by a workplace.

Kano (1984) further developed attractive quality theory on the basis of Herzberg et al.'s (1959) two-factor theory by classifying attributes into five dimensions, namely attractive, 1D, must-be, indifferent and reverse qualities. When *attractive* quality attributes (i.e. delight, value added and surprised or wow attributes) are provided, customers are satisfied but they will not be dissatisfied if these attributes are not present. Therefore, *attractive* quality dimension displays a positive asymmetric relationship with satisfaction. Meanwhile, a negative asymmetric relationship exists between *must-be* quality attributes and satisfaction. When *must-be* attributes (i.e. dissatisfiers and frustrators) are not available, customers are unhappy and disappointed. However, when these attributes are supplied, customers are not necessarily pleased, as customers take *must-be* attributes for granted. One-dimensional (*1D)* quality attributes (i.e. criticals/hybrids) exhibit a positive linear relationship with satisfaction. When these attributes are fulfilled, customers are satisfied; otherwise the absence of attributes causes dissatisfaction. *Indifferent* quality attributes do not affect satisfaction

or dissatisfaction of customers, regardless of whether they are provided or not. *Reverse* quality attributes show a negative symmetric relationship with satisfaction. When these attributes are supplied, dissatisfaction occurs while satisfaction is triggered when they are not present. For example, the presence of nightclub in a hotel may unfavourably affect hotel guests because an incurring noise from a nightclub could disrupt their sleeps. Thus, reverse quality attributes should be de-emphasized or offered on an optional basis.

Certain scholars (Back, 2012; Mikulic & Prebezac, 2008; Oliver, 1997) have further modified Kano's (1984) attractive quality theory. Specifically, Oliver (1997) postulated a *3D* structure of attributes, namely, bivalent satisfiers, monovalent dissatisfiers and monovalent satisfiers that constitute customer satisfaction/dissatisfaction. Bivalent satisfiers cause satisfaction or dissatisfaction and are regarded as hybrid attributes, exhibiting a symmetric relationship with satisfaction. Monovalent dissatisfiers are conceptualised as *must-be* (must-have) attributes, whereas monovalent satisfiers (value-added and delighted attributes) induce customer satisfaction when offered and do not lead to dissatisfaction even when not supplied.

In the hospitality and tourism industry, the three-factor model (dissatisfiers, hybrids and satisfiers) has been adopted to investigate the asymmetric effects of attributes on satisfaction in the context of Airbnb (Ju et al., 2019), honeymoon tourism (Lee et al., 2020), incentive travel (Lee et al., 2017) and convention attendee satisfaction (Lee & Min, 2013). Consistent with the abovementioned research, this current study explores the asymmetric nature of airport attributes on air traveller satisfaction on the basis of the following asymmetric domains:

1) 'Dissatisfiers' and 'frustrators' refer to negative asymmetrical attributes. Dissatisfiers are regarded as *must-have* attributes that provoke dissatisfaction when they are unavailable. Frustrators are considered extreme dissatisfiers, inducing a high degree of dissatisfaction when they are not offered. However, these attributes do not cause satisfaction when they are fulfilled.

2) 'Hybrids' belong to attributes that show a symmetric linear relationship (*1D*) with satisfaction. When these attributes are present, travellers are happy; otherwise travellers feel dissatisfied.

3) Positive asymmetry involves attributes under 'satisfiers' and 'delighters'. Satisfiers are regarded as *attractive* or *value-added* attributes because travellers do not generally expect these attributes. Delighters, which are an extreme version of satisfiers, increase satisfaction to a level when consumers feel extremely joyful. Although satisfiers and delighters induce satisfaction if available, an absence of these attributes does not create customer dissatisfaction.

3. Methodology

3.1 Measurement

Following Hinkin's (1995) recommendation, this study employed a mixed-method strategy to generate and validate measurement items for airport quality attributes. A qualitative study was conducted, including an in-depth analysis of the literature review and the views of a panel of experts, followed by a quantitative approach (i.e. a survey and statistical analysis). In line with Delcourt et al. (2016), the mixed-method strategy is used for unveiling and validating attributes unidentified in previous research that may be salient for the current study.

This research first generated 44 items. It derived the potential attributes of an airport from the existing air travel literature, along with the following 10 dimensions: airport signage and layout, terminal environment, flight information screens, check-in, security, passenger facilities, immigration, departure hall, baggage service, and leisure and entertainment (Bezerra & Gomes, 2016; Brida et al., 2016; Park & Park, 2018; Prentice & Kadan, 2019; Trischler & Lohmann, 2018). After the in-depth analysis of literature review, 44 quality attributes were incorporated into statements. Next, this study performed a content validity assessment by engaging a panel of experts. The expert panel was purposively recruited considering their proficiencies and experiences. Experts with various backgrounds were assumed to have different views of the study attributes. In this study, the experts comprised of three industry practitioners who have more than 10 years of experience working in the airline business and three university professors whose research focus is relevant to Thailand's air transport industry. Table 1 displays characteristics of experts in the panel. These experts were contacted for an interview in person on the key service attributes of the airport. On top of that, they were asked to evaluate the applicability of the measurement items toward the associated constructs by selecting an appropriate value on a scale of 5 (highly applicable) to 1 (totally inapplicable) and also requested to indicate their concerns and recommendations on each item (see Appendix 2). As a result, the panel recommended four items to be added, namely, 'availability of bed-seating for transfer passengers', 'reasonable price of food products at restaurants', 'communication of security staff' and 'communication of check-in staff'. One item was deleted (i.e. information display for inbound baggage claim) because the experts felt that this item was redundant with the items indicated in flight information screens. Consequently, this study included 47 underlying quality attributes for the survey. Regarding the measures for airport satisfaction (i.e. 'I am very satisfied with the overall experience of this airport', 'I feel satisfied with the comforts of the airport amenities' and 'As a whole, I am happy with this airport'), they were modified from Oliver (1981) and Park and Park (2018). Likert-type scale ranging from 1 = strongly disagree to 7 = strongly agree was adopted for the operationalisation of the items.

Table 1: Characteristics of Expert Panel

Type of Expert	Respondent	Position	Gender	Years of Experience
Industry Practitioner	Respondent 1	Airline employee (Senior position)	Male	10
	Respondent 2	Airline employee (Senior position)	Male	11
	Respondent 3	Airline cabin crew (Senior Flight Stewardess)	Female	10
University Professor	Respondent 4	Assistant Professor (Tourism & Air Transport)	Female	12
	Respondent 5	Lecturer (Airline management)	Male	5
	Respondent 6	Lecturer (Airline management)	Male	3

3.2 Data collection

To collect data, this study focused on potential Thai travellers who had visited an international airport in the past 12 months. The samples were collected with a screening dichotomous question (i.e. 'I have visited an international airport as a passenger in the past 12 months'). Only respondents who answered 'Yes' were allowed to participate in the survey. The respondents were also instructed to answers a few questions to recall their experience at an airport. For example, respondents were requested to indicate an airport name on the basis of their recent visit to trigger their memory cues. Only respondents who recalled their visits to an airport within Thailand were considered. Table 2 provides the airport names that each respondent referred to.

Table 2: International Airports in Thailand: Visited by Respondents

Airport Name	**Frequency**	**%**
Suvarnabhumi Airport (BKK)	417	47.4
Don Mueang International Airport (DMK)	369	42
Phuket International Airport (HKT)	38	4.3
Chiang Mai International Airport (CNX)	28	3.2
Others (e.g. Samui, Krabi)	27	3.1

This study performed the data collection throughout February 2020. Given that an on-site survey was not advisable to conduct as a result of the COVID-19 pandemic, an online link to the questionnaire of the survey was distributed to friends and relatives of the researchers. Considering that the population of airport passengers over the past 12 months is difficult to capture, this study employed convenience and snowball sampling techniques to recruit the study participants. 879 completed surveys from the representatives were collected. The demographic profiles indicated that 61% of the respondents are female and more than 75% are between 18 and 30 years old. This later statistic is in line with the information provided by Kunst (2019), who revealed that around 70% of frequent online travel users are between the ages of 18 and 29. All of the respondents had recalled their recent experience when visiting an international airport in Thailand. 48.1% travelled via airports 1–2 times per year, followed by 3–4 (21.6%), 5–6 (12.4%), 7–8 (4.9%) and 9 times and above (12.9%).

3.3 Measurement validation: reliability and construct validity

Applying the dimensions of airport quality previously identified in the qualitative process (i.e. literature review and expert panel review), a model to measure quality attributes was proposed with 10 factors, namely airport signage and layout, terminal environment, flight information screens, check-in, security, passenger facilities, immigration, departure hall, baggage service, and leisure and entertainment. CFA test was first performed to verify the validity of the measurement model using the data from Thai travellers (n = 879). Table 3 exhibits the results of CFA. The CFA results also confirmed that the 10 underlying domains possess satisfactory global fit indices [$\chi 2$= 3726.23 (df = 139), RMSEA = 0.056, CFI = 0.922, TLI = 0.915], thereby suggesting the acceptable model fit into the data (Hair et al., 2010). As also exhibited in Table 4, the composite reliability (CR) of each factor is acceptable given that all constructs are higher than the threshold of 0.7 (Nunnally, 1978).

Convergent validity was supported as the average variance extracted (AVE) values for every construct exceeded the cut-off point of 0.5 (Fornell & Larcker, 1981). Discriminant validity was also validated given that most of the AVE was greater than a squared correlation of the examined constructs. In this study, airport quality attributes were verified to include a 10-dimension structure with 47 items.

Table 3: Results of Measurement Validation (CFA)

Factor	Factor Loading	t-value
Factor 1: Airport Signage and Layout (AS)		
1. The airport's signage and wayfinding clearly direct passengers to the airport's services/facilities.	0.81	24.64
2. The size of signage is suitable	0.81	24.44
3. The quantity of signage is adequate.	0.82	25.03
4. The airport's layout is properly designed to cater for passengers' special needs.	0.75	N/A
5. The airport's physical layout enables easy movement of passengers.	0.74	22.24
Factor 2: Terminal Environment (TE)		
1. The lighting at the airport gives a warm feeling.	0.75	23.06
2. The temperature at the airport is suitable.	0.74	22.71
3. The announcement levels at the airport are adequate.	0.69	20.99
4. The aroma at the airport is pleasant and desirable.	0.77	N/A
5. The airport maintains clean facilities.	0.81	25.14
Factor 3: Flight Information Screens (FI)		
1. Information screens are widely available for passengers.	0.88	34.34
2. The flight information screens are clearly visible.	0.87	33.47
3. Information on screens is always updated.	0.81	29.82
4. The location of information screens is appropriate.	0.86	N/A
Factor 4: Check in (CI)		
1. Check-in staff are courteous and helpful.	0.79	24.04
2. Check-in staff communicate clear and appropriate messages.	0.80	24.55
3. The check-in process is efficient.	0.81	24.76
4. Luggage carts are available for passengers.	0.75	N/A
5. Waiting time at check-in is appropriate.	0.80	24.52
6. The self-check-in kiosks are appropriately designed and easy to use.	0.74	22.51
Factor 5: Security (SC)		
1. I felt safe and secure during the security screening processes.	0.83	29.80
2. Security staff are friendly, courteous and helpful.	0.86	31.74
3. Security staff communicate clearly and deliver appropriate messages.	0.86	31.26
4. The security screening for passengers and personal belongings is thorough.	0.83	N/A
5. The waiting time at security checkpoints is appropriate.	0.85	30.66
Factor 6: Passenger Facilities (PF)		
1. Washroom/toilets are clean.	0.77	24.42
2. Washroom/toilets are widely available for passengers.	0.80	25.48
3. WI-FI and PCs are available for passengers.	0.74	23.45
4. Restaurants offer many products.	0.77	N/A
5. Restaurants offer products with reasonable prices.	0.64	19.78
6. Banks/ATM/Exchanges are available to cater for passengers' needs.	0.73	23.08
7. Retail stores are available to cater for passengers' needs.	0.75	23.80
Factor 7: Immigration (IM)		
1. The waiting time in the outbound immigration area is suitable.	0.86	28.90
2. The waiting time in the inbound immigration area is suitable.	0.85	28.69
3. The waiting time at the inbound baggage belt area is suitable.	0.80	N/A
Factor 8: Departure Hall (DH)		

1. The departure hall is not crowded.	0.81	29.55
2. The airport provided aerobridges in good condition that eased access from the terminal to the aircraft.	0.82	28.90
3. The airport provided comfortable and spacious seating at the waiting gate.	0.85	29.55
4. The airport provided enough seating in the gate area.	0.84	N/A
5. The airport provided enough bed seating for transfer passengers.	0.80	29.04
Factor 9: Baggage Service (BS)		
1. The baggage processing facilities are of good quality.	0.84	26.41
2. The circulation space for inbound baggage reclaim is spacious.	0.85	26.08
3. Baggage trolleys are easy to find.	0.76	N/A
Factor 10: Leisure and Entertainment (LEN)		
1. The interior decoration of the airport is appealing.	0.85	31.79
2. There is updated interior and exterior decoration.	0.87	32.90
3. The use of airport amenities is pleasurable.	0.84	N/A
4. The events and exhibitions provided by the airport are fascinating.	0.85	31.82

Note: All factor loadings are significant at $p < 0.000$. Parameters are fixed at 1.0 for maximum likelihood estimation. Thus, t-values are not obtained (N/A) for parameters fixed at 1.0 for identification purposes.

Table 4: Squared Correlations, AVE and Construct Reliability

	Factor 1	**Factor 2**	**Factor 3**	**Factor 4**	**Factor 5**	**Factor 6**	**Factor 7**	**Factor 8**	**Factor 9**	**Factor 10**
F1	**0.62**									
F2	0.56	**0.57**								
F3	0.50	0.51	**0.73**							
F4	0.45	0.48	0.57	**0.61**						
F5	0.45	0.53	0.49	0.64	**0.72**					
F6	0.48	0.55	0.49	0.52	0.59	**0.55**				
F7	0.40	0.45	0.38	0.46	0.53	0.61	**0.70**			
F8	0.47	0.53	0.46	0.51	0.59	0.67	0.64	**0.68**		
F9	0.43	0.45	0.47	0.52	0.54	0.57	0.52	0.64	**0.67**	
F10	0.44	0.47	0.39	0.41	0.49	0.59	0.49	0.64	0.56	**0.73**
CR	0.89	0.87	0.92	0.90	0.93	0.90	0.88	0.91	0.86	0.96
MEAN	5.13	5.04	5.31	5.30	5.18	4.93	4.94	5.02	5.18	4.84
SD	1.09	1.11	1.15	1.05	1.15	1.16	1.25	1.20	1.14	1.34

Note: CR = Composite reliability; SD = Standard deviation; AVE in **bold** on diagonal line.

3.4 Impact range performance analysis (IRPA) and impact asymmetry analysis (IAA)

This study employed IRPA and IAA as a technique to investigate the asymmetric effect of attributes on satisfaction which has been used in various tourism studies (Back, 2012; Lee et al., 2019; Mikulić & Prebežac, 2008). Following the mechanism for performing IRPA and IAA analysis recommended by Mikulić and Prebežac (2008), the research first created the dummy variables for the penalty index (PI) and the reward index (RI). RI signifies attributes that are positively related to satisfaction, whilst

PI indicates attributes that are negatively related to satisfaction (Lee & Choi, 2019). Given that PI is used to measure the effect of extremely low performance on satisfaction (Mikulić & Prebežac, 2008), this study thus generated the PI by coding the lowest performance rating (i.e. 1) of an attribute as 1, whereas the other performance ratings (2 to 7) were coded as 0. The RI was created in the reverse way. The highest performance, which was 7, was inputted as 1, whilst the remaining performance ratings (1–6) were coded as 0. A multiple regression analysis was then conducted by employing the two sets of dummy variables as predictive variables with airport satisfaction as the outcome variable. The research used the resulting standardised coefficients in further steps of the analysis. Then, the absolute values of PI and the value of RI were summed to estimate the range of impacts on satisfaction (RIS) of an attribute. Considering the following equations, proposed by Mikulić and Prebežac (2008), the estimated results were used to compute the value of an attribute's satisfaction-generating potential (SGP) and dissatisfaction-generating potential (DGP). Consequently, the impact asymmetry (IA) was presented.

$$(1)\ \mathrm{SGP}i = \mathrm{RI}/\mathrm{RIS}i,$$

$$(2)\ \mathrm{DGP}i = |\mathrm{PI}|/\mathrm{RIS}i. \text{ And}$$

$$(3)\ \mathrm{IA}i \text{ index} = \mathrm{SGP}i\text{-}\mathrm{DGP}i$$

(RI = reward index for attribute i, PI = penalty index for attribute i, RISi = |PI| + RI = range of impacts on satisfaction and SGPi + DGPi = 1)

This study also identified the range of IA according to Mikulić and Prebežac's (2008) recommendation. The following five categories were considered: 1) frustrators (IA < −0.4), dissatisfiers (−0.4 ≤ IA < −0.1), hybrids (−0.1 ≤IA ≤0.1), satisfiers (0.1 < IA ≤0.4) and delighters (IA > 0.4). Table 5 exhibits the IAA results.

Table 5: Results of IRPA and IAA

AIRPORT ATTRIBUTES	RI	PI	RIS	SGP	DGP	IA	AR	APS
Factor 1: Airport Signage and Layout (AS)								
1. The airport's signage and wayfinding clearly direct passengers to airport's services/facilities.	**0.10**	−0.07	0.17	0.58	0.42	0.17	Satisfiers	5.47
2. The size of signage is appropriate.	**0.11**	0.08	0.19	0.57	0.43	0.15	Satisfiers	5.41
3. The quantity of signage is sufficient.	**0.13**	−0.06	0.20	0.68	0.32	0.37	Satisfiers	5.30
4. The airport's layout is properly designed to cater for passengers' special needs.	**0.09**	**−0.11**	0.20	0.46	0.54	−0.08	Hybrid	5.01
5. The airport's physical layout enables easy movement of passengers.	**0.12**	**−0.16**	0.28	0.41	0.59	−0.17	Dissatisfiers	5.03
Factor 2: Terminal Environment (TE)								
1. The lighting at the airport gives a pleasant feeling.	**0.12**	**−0.13**	0.25	0.47	0.53	−0.05	Hybrid	5.10
2. The temperature at the airport is comfortable.	**0.14**	**0.06**	0.19	0.71	0.29	0.41	Delighters	5.22
3. The announcement levels at the airport are appropriate.	0.15	−0.05	0.19	0.76	0.24	0.52	Delighters	5.14
4. The aroma at the airport is pleasant and desirable.	0.12	**−0.13**	0.25	0.49	0.51	−0.03	Hybrid	5.04
5. The airport maintains clean facilities.	**0.29**	**−0.18**	0.48	0.62	0.38	0.23	Satisfiers	5.30
Factor 3: Flight Information Screens (FI)								
1. Information screens are widely available for passengers.	**0.25**	**−0.15**	0.41	0.62	0.38	0.25	Satisfiers	5.40

2. Flight information screens are clearly visible.	0.03	−0.05	0.08	0.38	0.62	−0.24	Dissatisfiers	5.28
3. Information on screens is always updated.	**0.13**	0.04	0.17	0.75	0.25	0.49	Delighters	5.59
4. The location of information screens is suitable.	**0.16**	−0.03	0.19	0.84	0.16	0.68	Delighters	5.38
Factor 4: Check-in (CI)								
1. Check-in staff are courteous and helpful.	0.08	−**0.18**	0.27	0.31	0.69	−0.38	Dissatisfiers	5.42
2. Check-in staff communicates clear and appropriate messages.	0.09	0.01	0.10	0.93	0.07	0.87	Delighters	5.53
3. The check-in process is efficient.	**0.02**	−0.03	0.04	0.37	0.63	−0.27	Dissatisfiers	5.35
4. Luggage carts are available for passengers.	**0.16**	−0.06	0.22	0.73	0.27	0.46	Delighters	5.51
5. Waiting time at check-in is appropriate.	**0.14**	−**0.07**	0.21	0.69	0.31	0.38	Satisfiers	5.16
6. The self-check-in kiosks are appropriately designed and easy to use.	**0.13**	−**0.10**	0.23	0.55	0.45	0.10	Hybrid	5.20
Factor 5: Security (SC)								
1. I felt safe and secure during the security screening processes.	**0.18**	−**0.09**	0.27	0.66	0.34	0.32	Satisfiers	5.24
2. Security staff are friendly, courteous and helpful.	**0.13**	−0.04	0.18	0.76	0.24	0.53	Delighters	5.33
3. Security staff communicate clear and appropriate messages.	0.03	−**0.10**	0.13	0.26	0.74	−0.48	Frustrators	5.27
4. The security screening for passengers and personal belongings was thorough.	**0.15**	0.03	0.18	0.82	0.18	0.64	Delighters	5.38
5. Waiting time at security checkpoints is appropriate.	**0.14**	−**0.14**	0.28	0.48	0.52	−0.03	Hybrid	5.23
Factor 6: Passenger Facilities (PF)								
1. Washroom/toilets are clean.	**0.20**	−**0.09**	0.29	0.70	0.30	0.39	Satisfiers	5.30
2. Washroom/toilets are widely available for passengers.	**0.14**	−**0.08**	0.22	0.64	0.36	0.27	Satisfiers	5.17
3. WI-FI and PCs are available for passengers.	**0.17**	−**0.09**	0.26	0.65	0.35	0.30	Satisfiers	4.87
4. Restaurants offer many products.	**0.09**	−0.05	0.14	0.67	0.33	0.33	Satisfiers	5.06
5. Restaurants offer products with reasonable prices.	**0.10**	−**0.17**	0.27	0.36	0.64	−0.28	Dissatisfiers	4.38
6. Banks/ATM/Exchange are available to cater for passengers' needs.	**0.11**	−0.01	0.12	0.95	0.05	0.90	Delighters	5.21
7. Retail stores are available to cater for passengers' needs.	0.03	−**0.10**	0.12	0.22	0.78	−0.57	Frustrators	5.19
Factor 7: Immigration								
1. The waiting time in the outbound immigration area is appropriate.	**0.14**	−0.08	0.22	0.62	0.38	0.25	Satisfiers	5.07
2. The waiting time in the inbound immigration area is appropriate.	**0.17**	−**0.11**	0.28	0.61	0.39	0.21	Satisfiers	4.99
3. The waiting time at the inbound baggage belt area is appropriate.	**0.20**	−**0.14**	0.33	0.59	0.41	0.18	Satisfiers	5.00
Factor 8: Departure Hall (DH)								
1. The departure hall is not crowded.	0.07	−**0.16**	0.22	0.30	0.70	−0.41	Frustrators	5.08
2. The airport provided aerobridges in good condition that eased access from the terminal to the aircraft.	**0.21**	−0.04	0.25	0.83	0.17	0.65	Delighters	5.31
3. The airport provided comfortable and spacious seating at the waiting gate.	**0.15**	−0.01	0.17	0.91	0.09	0.82	Delighters	5.24
4. The airport provided enough seating in the gate area.	0.06	−**0.12**	0.18	0.34	0.66	−0.33	Dissatisfiers	5.15
5. The airport provided enough bed seating for transfer passengers.	**0.11**	−**0.11**	0.22	0.51	0.49	0.01	Hybrid	4.94
Factor 9: Baggage Service (BS)								
1. The baggage processing facilities are of good quality.	**0.23**	−0.04	0.27	0.86	0.14	0.71	Delighters	5.26
2. The circulation space for inbound baggage reclaim is large and pleasant.	**0.16**	−**0.15**	0.30	0.51	0.49	0.02	Hybrid	5.24
3. Baggage trolleys are easy to find.	**0.17**	−**0.13**	0.30	0.57	0.43	0.15	Satisfiers	5.33
Factor 10: Leisure and Entertainment (LEN)								
1. The interior decoration of the airport is attractive.	**0.16**	−**0.11**	0.28	0.59	0.41	0.18	Satisfiers	5.15
2. There is updated interior and exterior decoration.	**0.22**	−**0.12**	0.34	0.64	0.36	0.28	Satisfiers	5.18
3. The use of airport amenities is enjoyable.	0.09	−**0.09**	0.17	0.51	0.49	0.01	Hybrid	4.74

4. The events and exhibitions provided by the airport are interesting.	**0.12**	**−0.15**	0.27	0.45	0.55	−0.09	Hybrid	4.70

Remarks: **Bold values:** standardised coefficients were significant at $p < 0.05$; RI = reward index; PI = penalty index; RIS = Range of impact on satisfaction (|PI|+ RI); SGP = satisfaction-generating potential (RI/RICSi); DGP = dissatisfaction generating potential (|PI|/RISi); IA = impact–asymmetry (SGPi–DGPi); AR = Asymmetric range; APS: Attribute–performance score.

4. Results and analysis

This study examined the asymmetric effect of airport attributes on air traveller satisfaction on the basis of the abovementioned mechanism. As exhibited in Table 5, evidence exists of the asymmetric effect on satisfaction (positive and negative) derived from the results of all 10 airport–quality domains, whilst the symmetric effects (hybrid) are also present in attributes of six domains.

The findings reveal that the 'immigration' domain has *all* attributes showing positive asymmetry (inbound (IA=0.21), outbound waiting time (0.25) and waiting time at the baggage belt (0.18) – all in satisfiers). The next three following domains show many positive attributes that reflect positive asymmetry, namely the 'terminal environment' domain (with attributes of temperature (0.41), announcement level (0.52), clean facilities (0.23)), 'baggage service' domain (with attributes of quality of facilities (0.71), baggage trolleys (0.15)) and 'leisure and entertainment' domain (with attributes of interior decoration (0.18), updated interior and exterior (0.28)). Most of attributes fall into satisfiers, only temperature and announcement levels are delighters. All of these attributes induce satisfaction in air travellers when they are produced but will not create dissatisfaction if they are missing. Air travellers generally enjoy these benefits and consider them as value added, although they do not generally expect these attributes to be well managed and supplied.

Meanwhile, these three domains also have hybrid attributes that reflect symmetric effect. Items of lighting (IA= −0.05) and aroma (−0.03) (from the 'terminal environment' domain), circulation space attribute (0.02) (from 'baggage service' domain) and airport amenities (0.01) and interesting events and exhibitions (−0.09) attributes (from 'leisure & entertainment' domain) will induce passenger satisfaction when they are well provided/delivered and create dissatisfaction when they are not. When these attributes are well presented, passengers are believed to be happy, but they are likely to be discontented when the attributes are not properly supplied.

The next two domains of 'flight information screens' and 'passenger facilities' have shown only asymmetric relationship (positive and negative) with passenger satisfaction, with a higher number of positive attributes than the negative ones. The availability of information screens (IA = 0.25) and updated information screens (0.49), together with their location (0.68), are attributes that reflect positive asymmetry, whereas the attributes that relate to negative asymmetry are clearly visible information screens (−0.24), price of restaurants (−0.28) and available retail/duty free stores (−0.57). These negative items will only draw dissatisfaction if they are poorly presented (i.e. when the screens are not visible, when the food price is high and when there are few duty-free shops) but will not receive satisfaction if they are delivered as passengers take these items for granted and already expect an acceptable level of provision of such items.

'Airport signage and layout', 'check-in', 'security' and 'departure hall' domains are the four domains which have attributes that relate to all categories: positive and negative asymmetries as well as symmetric relationship. Although most attributes in these four domains represent a positive asymmetric relationship to passenger satisfaction, the attributes that pose potential to induce

dissatisfaction when poorly provided (hybrid) comprise airport layout for passengers with special needs (IA = −0.08), self-check in kiosk (0.10), waiting time at security (−0.03) and adequate bed seating (0.01). On the other hand, passengers see the following attributes as must-have factors and will only show dissatisfaction when the items are not properly provided. Those negative–asymmetric attributes are airport layout that enables passenger movement (−0.17), friendly and helpful check-in staff (−0.38), efficient check-in (−0.27), good communicating security staff (−0.48), crowded departure hall (−0.41) and adequate seating in gate area (−0.33). Apart from crowded departure halls, which is perceived as a frustrator, the rest of the attributes fall into dissatisfiers.

Considering that the respondents are all of Thai nationality and that the selected international airports of their responses are based in Thailand, and 96.9% of the responses come from the three key international airports, managed and operated by AOT, the findings can be perceived to represent their perception of airports in a specific context and can explain why some findings from previous literature may vary. Against the backdrop, in the year 2019, AOT put attempts to improve the level of service (LoS) by creating application called 'LoS APP' (AOT Annual report, 2019), to help monitor the LoS and potential congestions which may occur in the key airport processes (e.g. check-in security, immigration, boarding, baggage claim and public transportation to-and-from airport), as well as to facilitate the flexibility and convenience for passengers. Hence, this could cause the variation of the results comparing to the previous research findings in other airports. To put it into context, for instance, all attributes in the 'immigration (or passport control)' domain in the current study are perceived as satisfiers, whereas immigration is generally perceived as a pain point for air travellers (Bogicevic et al., 2013; Martin-Domingo et al., 2019). To explain this, at BKK, as all the Thai citizens can proceed through electronic immigration during departure and arrival, they could perceive a fast process as an over-expected and value-added element, especially when comparing their own experiences of queuing at other international airports or seeing international travellers who must experience the manual process at Thai international airports as a comparison. Furthermore, items such as clean washrooms, that fall into satisfiers also reflect the context of the airports in this study, because the renovation of terminals, particularly at DMK, has improved the space and cleanliness of restrooms, and passengers can feel this as an over expected element. Ultimately, the overall results suggest that respondents generally have a positive perception and not overly high expectations airport attributes as these are evidenced from a large portion of attributes falling into delighter and satisfier categories.

When compared to the previous literature that employed the asymmetric analysis on the airport context, this current study found some similar notions compared to the study by Tseng (2020) which was conducted on the Taoyuan International Airport (TPE) in Taiwan. Quality attributes namely 'reasonable price of restaurant products', 'efficient check-in process', and 'appropriate message delivered by security staff' are regarded as the must-have attributes for both airport contexts (Taiwan and Thailand international airports), whilst for 'Wifi', 'comfortable seating facilities', and ''a wide range of restaurants are regarded as value-added attributes in both contexts. These aforementioned must-have attributes have commonly been regarded as basic requirements and generally cause dissatisfaction to passengers in other airport studies (see Bazerra & Gomes, 2016; Hong et al., 2020). On the contrary, some differences between the current study and the study by Tseng (2020) are found in attributes such as 'cleanliness of airport terminal', 'ambience of the airport' (for TPE, both are must-have attributes, yet hybrid attributes for this current study), indicating some specific natures of airports and different passenger perceptions under the two airport environments.

Furthermore, from the IRPA and IAA, airport quality attributes with greater RIS values and lower impact scores (IA) imply that priority should be given to these attributes (Back & Lee, 2015; Mikulić & Prebežac, 2008). The IRPA grid illustrates the position of attributes from the 10 domains in respect to RIS and IA values (Figure 2). Key critical points that are derived from the IRPA grid with greater RIS and lower IAA are shown as follows: 1) friendly and courteous check-in staff (RIS = 0.27, IA = −0.38) 2) price of the restaurant product (RIS = 0.27, IA = −0.28) and 3) crowded departure hall (RIS = 0.22, IA = −0.41). Although these items have been included amongst important items for airport service quality in the previous airport literature (Martin-Domingo et al., 2019), they are the crucial negative attributes for this study context and require attention from airport managers, as these items will only create dissatisfaction when the performance is not met.

5. Research contributions

5.1 Theoretical implications

The results of this study provide several meaningful theoretical contributions to the air transport and tourism literature. Despite not being the key objective of this research, this study firstly identifies multidimensional quality attributes of airports and investigates their dynamic effects on air traveller satisfaction. Although previous studies (e.g. Bezerra & Gomes, 2016; Bogicevic et al., 2016; Hong et al., 2020) adopted the airport attributes from the literature to scrutinise airport-related phenomena, no consensus has been reached regarding an appropriate scale to measure airport performance and quality. This research examined multidimensional attributes of airports following a measurement development mechanism recommended by Hinkin (1995). As a result, a 10-dimension structure, namely airport signage and layout, terminal environment, flight information screens, security, check -in, immigration, passenger facilities, departure hall, baggage service, and leisure and entertainment, was confirmed on the basis of empirical evidence. As the verified measures of airport attributes are essential to the air travel literature, the findings of this study can serve as an important scale in facilitating future air transport and tourism research, thereby contributing to the literature in this field.

More importantly, this study also methodologically complements the previous application of qualitative and quantitative approaches regarding service quality attributes and passenger satisfaction. For example, an earlier qualitative study on airport service quality used customer reviews to identify satisfier/dissatisfier attributes (see Bogicevic et al., 2013). However, the application of such a method limits the understanding of passenger satisfaction as it is unable to further designate consequent levels of passenger perception/satisfaction according to the provided attributes, as not all well-performed attributes lead to satisfaction, and not all under-performed attributes lead to dissatisfaction (Kano, 1984; Oliver, 1997). Moreover, regarding explanatory–quantitative study, the extant air travel studies (e.g. Bogicevic et al., 2016; Prentice & Kedan, 2019) have mostly emphasised the linear relationship of overall satisfaction with airport dimensions but not considered the asymmetric impact of airport attributes on passenger satisfaction. Even when the previous studies applied the structural equation modelling to investigate a more complexed relationship amongst variables, it is still based on linear causal relationship. These symmetric linear analyses enable researchers to examine whether relationships between variables are statistically significant (positive or negative). If the findings are not statistically significant, no relationship exists between the investigating variables. Arguably, the application of asymmetric analysis demonstrated in this current research reduces the limitation of the symmetric analysis. Testing asymmetrical

relationships allows researchers to better comprehend the differential effect of attributes on satisfaction, which the symmetric linear relationships cannot identify (Back 2012; Lee et al., 2020; Mikulić & Prebežac, 2008). In this study, the results of asymmetric relationships built on IRPA and IAA reveal five categories (i.e. delighter, satisfier, hybrid, dissatisfier and frustrator) of airport quality attributes suggesting that each attribute possesses differential roles with air traveller satisfaction. These differential roles represent a dynamic nature of attributes and how they affect level of satisfaction in a different way. Moreover, the combined relationship between RIS/IA, visually represented on the RIS-IA grid (see Figure 2), clearly indicates the degree of performance of each airport quality attribute, making poor performance attributes become more vivid and be the focus of implementation which will be further addressed in the practical implication hereunder.

5.2 Practical implications

The assessment of the asymmetric impacts of airport attributes on air traveller satisfaction enables industry practitioners and concerned authorities to prioritise attributes for airport operation and management. As shown in Figures 1 and 2, the results of IAA allow airport attributes to be categorised into value-added attributes (satisfiers and delighters), hybrid attributes (hybrids) and must-have attributes (dissatisfiers and frustrators). The IRPA grids allow airport managers to visually detect crucial attributes that should be prioritised (high RIS, low IA scores), whilst being aware of those attributes that passengers perceive as satisfied and have value added (high RIS, high IA). Value added attributes are deemed as attributes that enthuse and delight air travellers. Furthermore, hybrid attributes with high RIS scores should also be considered as those items that induce dissatisfaction if poorly offered and give high satisfaction if well offered.

Generally, must-have attributes are deemed as the core of the airport management and operation (given that air travellers demand these attributes). This study found must-have attributes of airport quality under this context to comprise: airport layout to avoid crowding, clearly visible information screens, courteous check-in staff, efficient check-in process, prices at restaurants, adequate seating in the gate area, appropriate message delivered by security staff, available retail stores and uncrowded departure halls. As aforementioned, some common attributes are found to be the general dissatisfactory factors in other airports mentioned in the earlier studies, for instance the notions on the restaurant price and the communication from security (see Tseng, 2020; Hong et al., 2020).

The perception of performance quality as perceived by air travellers is very sensitive to the must-have attributes. When must-have attributes are not properly managed to meet air travellers' expectation, the travellers are highly dissatisfied, although the availability of these must-have attributes do not provoke the travellers' satisfaction because they consider these attributes as basic elements. Amongst the must-have attributes identified in this study are available retail stores, uncrowded departure halls and appropriate messages by security staff, which are highly expected (as frustrators) by air travellers. Therefore, in improving airport quality, priority should be given to must-have attributes over value-added attributes, otherwise the entire airport experience of air travellers would be disrupted.

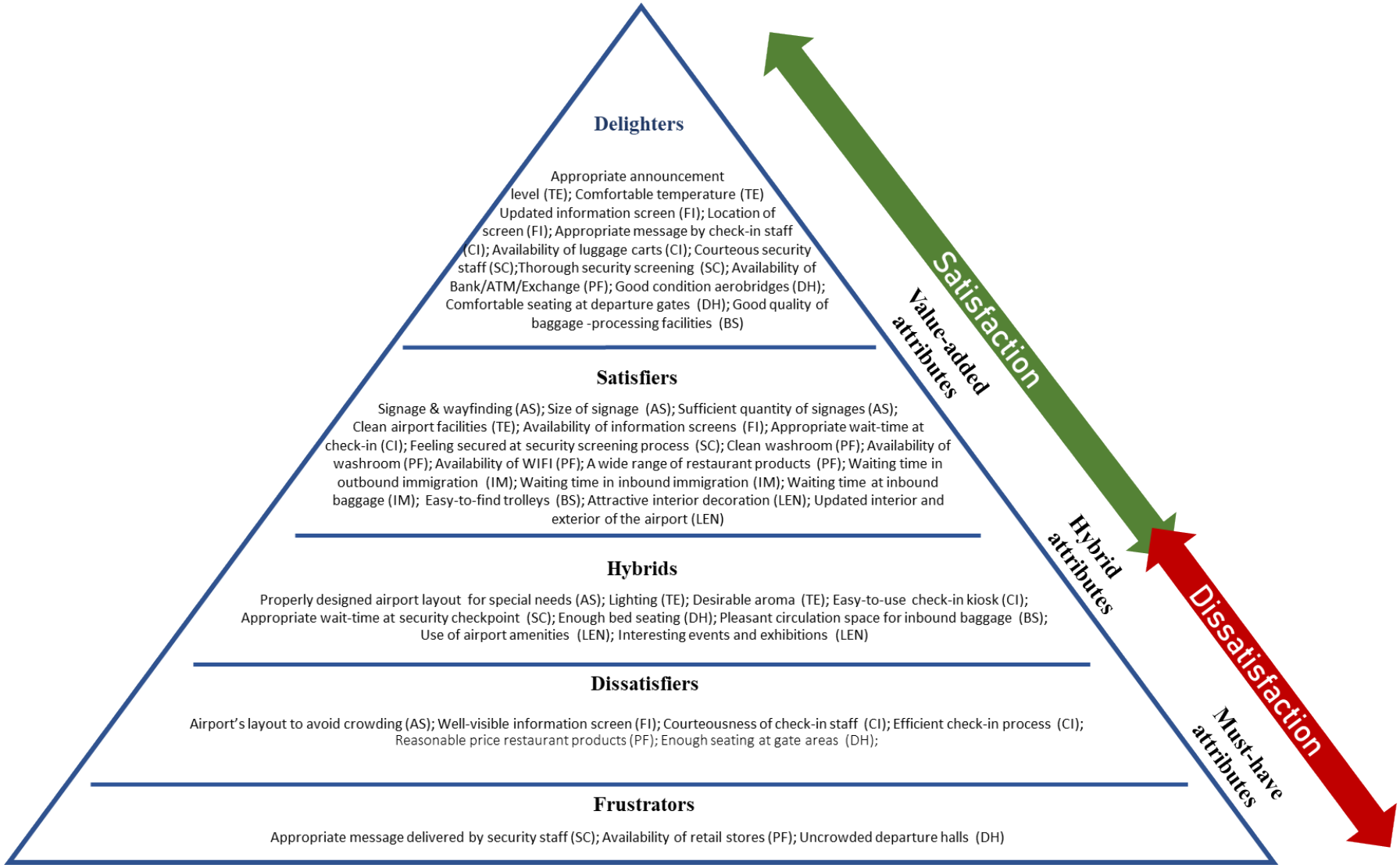
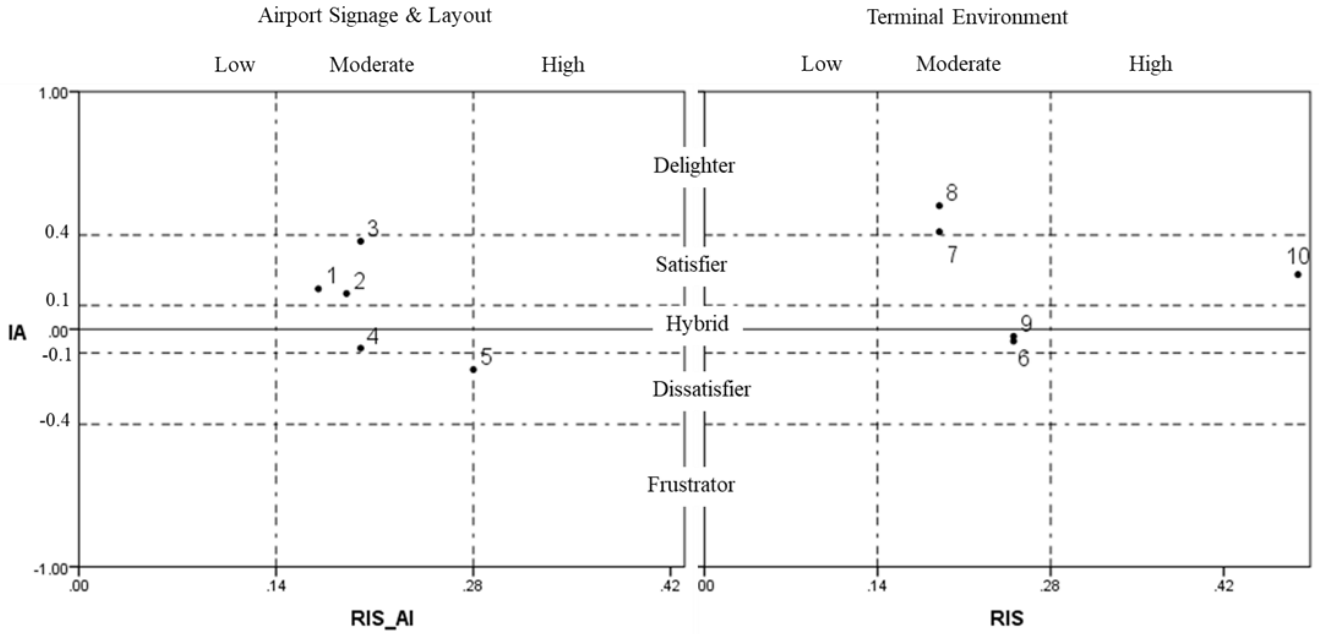
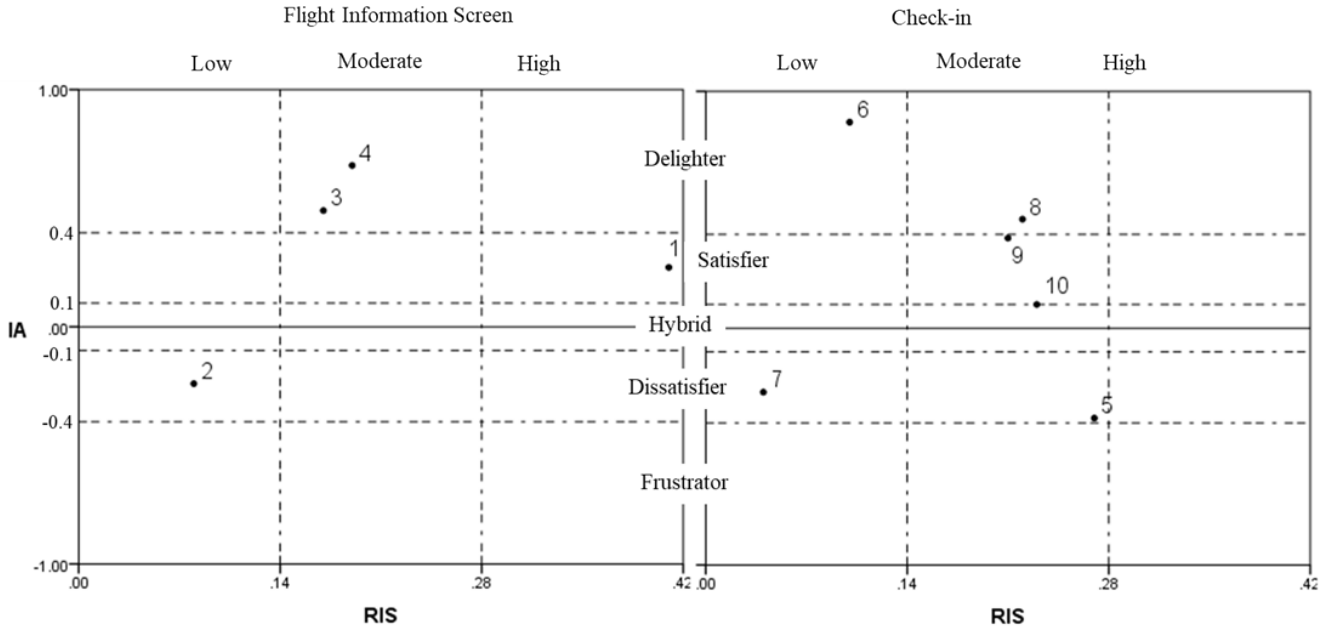


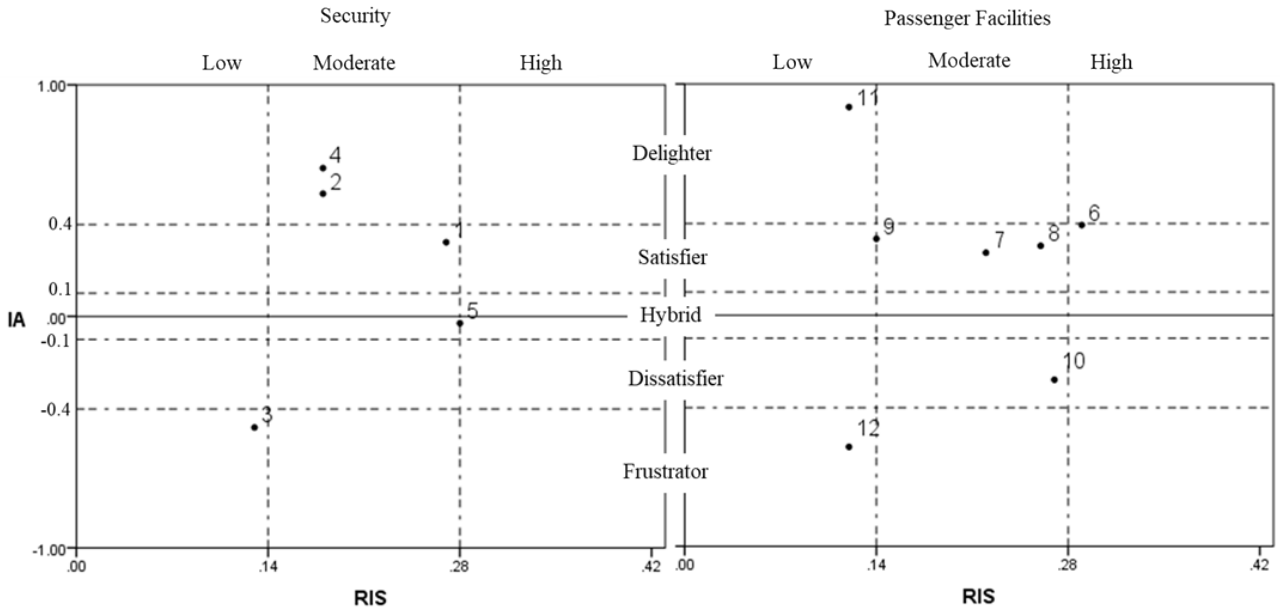
Figure 1: Prioritising Airport Quality Attributes



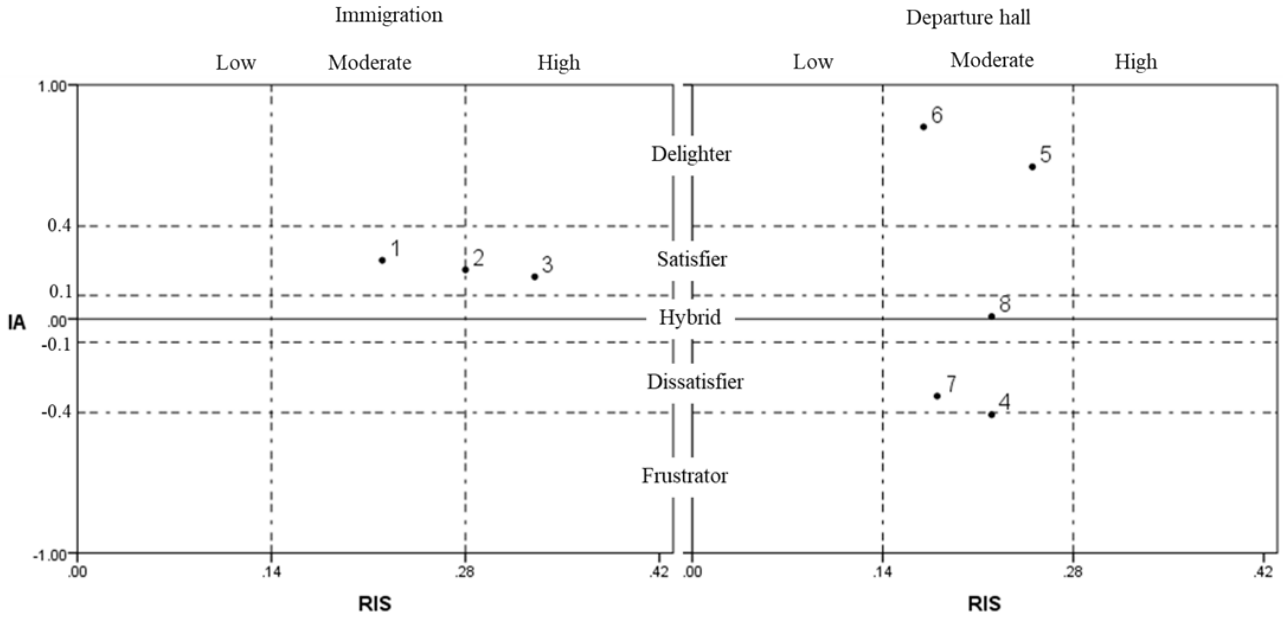
1. Signage and wayfinding 2. Size of signage 3. Sufficient quantity of signages 4. Properly designed airport layout for passengers with special needs 5. Airport's layout to avoid crowding 6. Lighting 7. Comfortable temperature 8. Appropriate announcement levels 9. Desirable aroma 10. Clean airport facilities



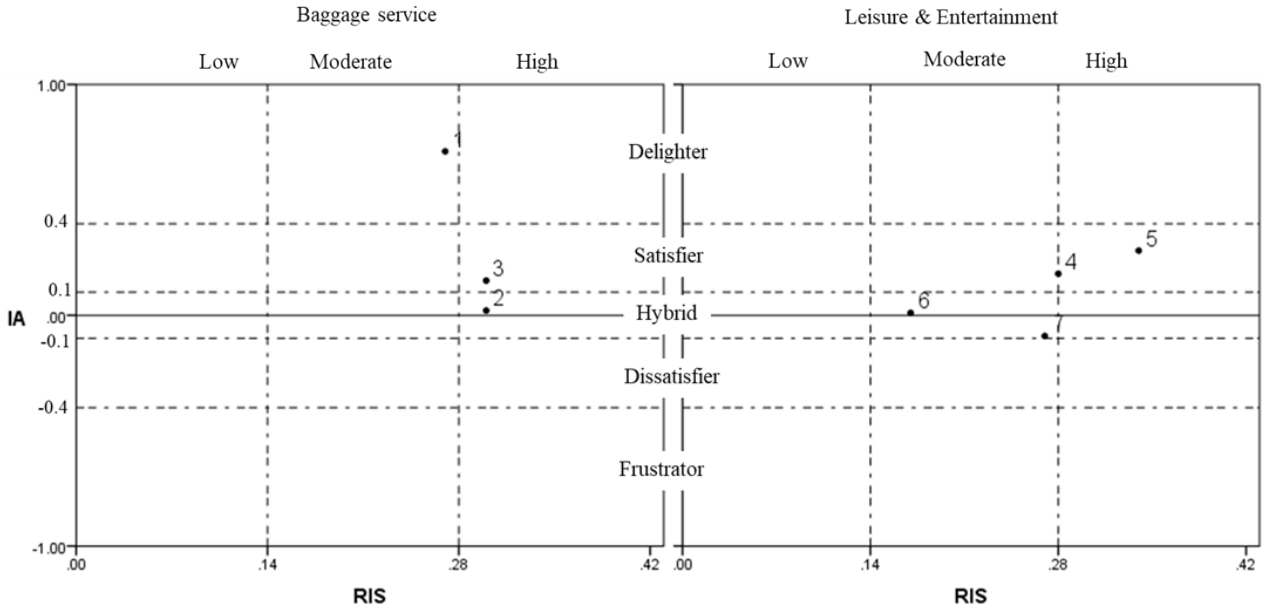
1. Availability of information screens 2. Clearly visible information screens 3. Updated information screens
4. Location of information screens 5. Courteousness of check-in staff 6. Appropriate messages delivered by check-in staff 7. Efficient check-in procesess 8. Availability of luggage carts 9. Appropriate waiting time at check-in 10. Self-check-in kiosks



1. Feeling secure at security screening process 2. Courteous security staff 3. Appropriate messages delivered by security staff 4. Thorough security screening 5. Appropriate waiting time at security checkpoint 6. Clean washrooms 7. Availability of washrooms 8. Availability of WI-FI and PCs 9. Wide range of restaurant products 10. Reasonably priced restaurant products 11. Availability of Bank/ATM/Exchanges 12. Availability of retail stores



1. Waiting time in the outbound immigration area 2. Waiting time in the inbound immigration area 3. Waiting time in the inbound baggage area 4. Uncrowded departure halls 5. Good condition of aerobridges 6. Comfortable seating at departure gates 7. Enough seating at gate areas 8. Enough bed seating



1. Good quality of baggage-processing facilities 2. Pleasant circulation space for inbound baggage claims
3. Availability of baggage trolleys 4. Attractive interior decoration 5. Updated interior and exterior
6. Use of airport amenities 7. Interesting events and exhibitions

Figure 2: IRPA Grid

The notion that all immigration attributes fall into satisfiers also emphasises the importance of technology, applied to the key international airports in this study, as a vital tool to facilitate the airport journey. This result, nevertheless, is found contradictory to some previous airport studies as frustrations towards the immigration have been the common phenomenon that could hardly well solved and often caused passenger dissatisfaction (see Bezerra & Gomes, 2016; Martin-Domingo et al., 2019). The fact that technology helps alter the pain point into process efficiency (Bogicevic et al., 2016) allows airports to improve waiting times and reduce the feeling of dissatisfaction. This aspect is more important now than ever, considering that the COVID-19 situation will make the future trip in the airport terminal become more complicated with more health-check procedures, such as disinfection tunnel and thermal scanners (Simpliflying, 2020).

In developing airport products or services, industry practitioners and concerned authorities can create a strategic checklist and survey to obtain traveller's perceptions of the airport based on the quality scale established in this study. For instance, if the results of an experience survey suggest the low performance of must-have attributes, the management should devote resources to improve the quality of these attributes, which are central to the success of the airport business. However, their efforts should only be invested on must-have attributes until they meet air traveller expectation, since exceeding the expectation is less likely to give rise to satisfaction, considering that air travellers take these attributes for granted. Moreover,

airport management should also pay attention to hybrid attributes with high impact as these items induce dissatisfaction if poorly offered and give high satisfaction if well offered. In addition, if the results of the survey reveal weak performance of value-added attributes, but no concern with must-have attributes, then the focus should be placed on the improvement of value-added attributes, which may enhance the air traveller's delight and excitement when they visit an airport. At this current stage, it is difficult to confirm that there are some existing airports applying the asymmetric analysis for their quality performance improvement due to the fact that most international airports commonly apply 34 service quality items of ASQ-ACI criteria to monitor the airport service performance. ASQ-ACI is ubiquitously known in the airport industry from its popularity, concrete criteria, and the possibility to conduct passenger satisfaction benchmark with other airports, which make it difficult of other methods of analysis to compete. So far, most practical evidences of using asymmetric analysis, especially the Kano model, are found in the goods-related industry (see for example consumer pacakaged goods in Fuel Cycly, 2019; product designs in Lin, 2019). However, if applicable, the asymmetric analysis is still recommended to airport managers as a potential alternative and the complementary approach to help airport managers develop a better insight on passenger satisfaction.

6. Limitations and future research

This study has some limitations to be addressed. Firstly, this study employed convenience and snowball sampling methods through an online survey to obtain the study samples (i.e. Thai travellers). A different sampling approach, performed onsite at major international airports within Thailand (e.g. Chiang Mai, Phuket, Samui, Suvarnabhumi, Don-Mueang) might capture a wider and more sampling representative. Secondly, the findings of this study are mainly based on the data associated with the international airports located within Bangkok, Thailand (i.e. Suvarnabhumi (BKK) and Don-Mueang (DMK)). Therefore, the results reflect this specific context and may not be able to be applied entirely to international airports in general. Considering that the airport business has been growing globally, research conducted in different regions/continents would help extend understanding of the dynamic nature of multi-quality attributes of an airport and the impact of asymmetric effects on passenger satisfaction. Thirdly, in this study, some dimensions (e.g. passenger facilities) and attributes (e.g. a variety of restaurants) are designed to obtain a broad perspective of air travellers' views towards an international airport. Thus, for airport managers to gain useful results for real application, items should be established to capture specific characteristics of an airport rather than general aspects. Fourthly, given that cross-cultural applicability of dimension structure of airport quality attributes may be diverse amongst air travellers from different countries, having respondents from one single nationality limits the scope of understanding airport performance. Hence, comparing multi-quality airport attributes between air travellers from different cultures would be an interesting research agenda. Fifthly, the findings of this research rely on a cross-sectional survey with self-reported measures. A cross-sectional data may only explain a phenomenon in a specific time, and

therefore, leads to a bias that results may differ considering a different survey period (Bland, 2001), especially when the quality attributes are dynamic and can change at times. Hence, future research could consider a longitudinal study to assess air passenger perceptions of the importance and performance of airport attributes, as well as cross-testing the different level of change in satisfaction when the quality attribute change its dynamic.

Lastly, due to the ability of IRPA and IAA to estimate relative importance/performance scores of attributes on overall customer satisfaction, these data analysis types were commonly employed to help prioritize attributes in most recent studies (Ju et al., 2019; Lee et al., 2020; Pratt et al., 2020). However, the IRPA and IAA using the procedure recommended by Mikulić and Prebežac (2008) may only be used to evaluate airport service quality at the attribute level, whereas the potential asymmetries in the relationships between underlying airport service dimensions and overall passenger satisfaction are not considered. Future research is encouraged to undertake an alternative technique (i.e. impact-asymmetry analysis) that detects asymmetric effects in customer satisfaction formation at both attribute and dimension level (Šerić & Mikulić, 2020).

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Appendix 1: Thailand's Key International Airports Managed by AOT*

Name	IATA Code	City	No. of Airlines	Number of passengers (2019)
Suvarnabhumi Airport	BKK	Bangkok	98	64,711,010
Don Mueang International Airport	DMK	Bangkok	7	41,008,379
Phuket International Airport	HKT	Phuket	42	17,848,662
Chiang Mai International Airport	CNX	Chiang Mai	32	11,321,459
Chiang Rai International Airport	CEI	Chiang Rai	11	2,953,096
Hat Yai International Airport	HDY	Hat Yai	5	4,028,410
Total				141,871,016

Source: WorldData.info (2020); AOT (2019).
*Data displayed in the table are prior to the Covid-19 situation