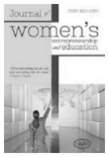
DOI: 10.28934/jwee22.34.pp194-222

ORIGINAL SCIENTIFIC PAPER

Female Medical Tourists' Enplanement Intentions and Airline Cabin Design in Developing Economies



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A B S T R A C T

The future of medical tourism in Africa is tied to travel, and aviation has a crucial role in promoting cross-border tourism. The impact of cabin design on the enplanement intentions of female medical tourists in Africa was investigated in this study. Data were obtained using an online semi-structured bi-lingual questionnaire. R software was used to analyze the survey data. Three factors of seat design (backrest, seat pitch, and legroom) had both direct and indirect influences on enplanement intention, according to OLS regression analysis and Sobel, Goodman and Aroian tests for mediation. This calls for diligent attention and efforts by airlines to remodel aircraft and redefine their services regarding cabin comfort for female medical tourists. This would give the airline an edge over competitors. As a multidisciplinary study, it sets the path toward the revival of the future of travel and tourism in Africa, post-pandemic.

KEYWORDS: *female, tourism, aviation, Africa Economies, innovation, strategy*

Introduction

The tourism industry has accounted for more than 7% of world exports in the past five years (World Tourism Organization, 2017). In recent times, medical tourism has been estimated to be worth over $100 billion (Fetscherin & Stephano, 2016). People migrate from underdeveloped economies to developed ones in pursuit of medical care, and vice versa, according to the modern trend of medical tourism. This trend is different from the traditional trend, which only saw the movement of people from developing economies to developed countries seeking medical assistance due to advanced and better treatment (Gill & Singh, 2011; Kan & Mukhopadhyay, 2022).

The role of aviation in medical tourism cannot be overemphasized. For instance, some emerging global airlines offer discounts to passengers traveling for health purposes and even partner with medical centers and travel councils (Azevedo et al., 2016; Apex, 2017). This indicates that airlines are significantly fuelling the medical tourism industry of developing nations. According to the International Civil Aviation Organization (2017), the African aviation market has the most potential for growth out of all global regions, as passenger traffic is expected to grow by around 3.8% annually up to 2032.

While acknowledging the contributions of medical tourism to developing nations, Hewlett (2011), in a *Harvard Business Review* article titled "Why Women Are the Biggest Emerging Market", noted that women control $15 trillion in spending power. Another report revealed that 75% of travelers who took such trips in 2019 were women. In agreement with Intrepid Travel (2020), the World Tourism Organization's (2019) global tourism report on women stated that between 63 to 64 percent of world travelers were female. The identification of gender differences will help place companies and key players in the tourism industry ahead of their counterparts. The ability to meet gender-specific needs will be the key to the successful differentiation of the tourism products they offer (Hao & Har, 2014). As a result, in order to stay relevant, significant firms in the travel business are focusing more on catering to the special needs of this gender. Some hotels, for example, have trained their staff to be more considerate while handling female guests by ensuring confidentiality, such as not reading out the room numbers of female guests (Hao & Har, 2014). These examples demonstrate that studying the choices and purchase intentions of the female gender in the tourism and hospitality industry can have implications for business and entrepreneurship (Čeperković, Šiljak & Đurađević, 2017). In this study, emphasis is laid on women's future decisions or intentions to utilize commercial air carriers when embarking on medical tourism trips. This is referred to as the enplanement intentions of female medical tourists throughout this manuscript.

Motivation, Objective and Novelty of the Study

In line with the recent developments in medical tourism, the airline industry is undoubtedly a competitive environment. An organization's survival is dependent on its ability to meet the requirements of its clients. A satisfied customer will return to purchase products on a frequent basis, resulting in long-term brand loyalty (Kwok, Jusoh & Khalifah, 2016). Because of the large number of female travelers, airlines cannot afford to neglect consumer needs in order to generate favorable word of mouth and retention. In light of the above, airlines need not spare any effort to create a satisfied customer as dissatisfied customers are more likely to share their bad experiences with others compared to satisfied customers (Hoffman & Bateson, 2011; Hoyer & Maclnnis, 2010 as cited in Kwok et al., 2016).

Sadly, the airline industry in many African developing economies has failed to meet businesswomen passengers' needs and expectations due to its gender-neutral service delivery. Interestingly, studies have indicated that gender influences expectations in terms of price, cabin characteristics, and in-flight activities and services, and that women as key decision-makers in terms of travel plans should be taken into account in airline service delivery (Aksoy, Akinci & Atilgan 2003; Kurtulmusoglu et al., 2018; Bond, 2019). From these studies, cabin feature was ranked highly as a key influencer of female passengers' airline choice. Hence, special attention needs to be paid to cabin design to attract the loyalty of female passengers, especially female medical tourists from developing countries in Africa.

Research Objective: The goal of this study is to see how cabin design affects the enplanement intentions of female medical tourists in underdeveloped countries.

Understanding the effect of cabin design on the enplanement intentions of female passengers would enable airlines to take specific measures toward investing in the comfort of women who get on board. This would encourage the innovativeness of the airline, restore passengers' confidence in these airlines and increase revenue both in the short and long run. It will allow airline brands to rethink their unique selling proposition (USP), reclaim their image, and compete effectively in the aviation sector. A deeper understanding of how cabin design elements influence women's intention to fly (enplanement intention) will aid aviation service managers and suppliers in the development and delivery of services aimed at improving the well-being of women passengers in the aviation industry (Alards-Tomalin et al., 2014). Additionally, the present study sparks up new discussions on how women's choices affect entrepreneurship and innovation decisions in the aviation industry. Moreover, it creates a basis for a multidisciplinary scholarly conversation among women studies, tourism, entrepreneurship and engineering disciplines.

Literature Review

The configuration of the interior aesthetic and usefulness of a plane's passenger-accessibility zones is known as airline cabin design. The design of the cabin may be geared towards improving the seating, lavatories, overhead compartments, in-flight entertainment, lighting or emergency exit (Aviation Triad, 2017). From an engineering and architectural perspective, designing a cabin to suit female tourists involves considering the optimization of several parameters. These parameters include the number of passengers, operating range, payload, fuel capacity, cruising speed, customer satisfaction, etc. (Hall et al., 2013). According to Liu et al. (2017), airline cabin design takes into account a variety of factors, including emotional, physical, and spatial factors, all of which affect passengers' perceptions of Personal space (legroom, armrest), safety, service efficiency, vibration and sound transmission, heating and air-conditioning, odor control, adequate ventilation, and seating arrangements, as well as comfortability for a variety of activities.

Consumer demands and passenger experience drive aircraft cabin design advancements more than any other factor. Air cabin design is driven by passenger anthropometric requirements and experience because, in the end, comfort and services are what determine an airline's efficiency. The ability to remain competitive is almost entirely influenced by how passengers' requirements are met. This demonstrates that design parameter selection cannot be left only to Original Equipment Manufacturers (OEMs), but must involve all stakeholders through a user experience-driven scenario (Hall et al., 2013). Feedback from the customer (who in this case is the female medical tourist) would tell if excellent work was done in the cabin design or point out lapses to be worked on. This implies that an empirical investigation on the influence of specific cabin design features on passengers' satisfaction (demonstrated by their enplanement intentions) is appropriate. This is even more pertinent considering the increasing trend of females in developing African countries traveling for medical tourism purposes (Abubakar et al., 2018; Onyeji, 2017)

Medical tourism is generally defined as travel away from one's home to seek medical care, examination, or therapy with tourists using the destination's facilities, installations, and attractions (Smith & Puczko, 2014). Medical tourism has many meanings, but it is essentially a combination of health tourism and wellness tourism (Stephano & Fetscherin 2016). The distinction between the two types of tourism is that medical tourism implies the presence of medical tension that necessitates inquiry, diagnosis, and treatment through certified medical programs and is considered a reactive type of health tourism. Wellness tourism, on the other hand, is regarded as a proactive form of health tourism focusing on the prevention or maintenance of good health through alternative means that do not require specific health facilities, medical practitioners, or intrusive tactics (Stephano & Fetscherin 2016). Put simply, medical tourism is the act of traveling to different nations to seek medical treatment (Ile & Tigu, 2017). According to travel researchers, many females in developing nations such as Nigeria travel to other countries for diverse medical procedures such as cosmetic surgeries, orthopedic surgeries, cardiac surgeries, neuro surgeries, and renal transplant surgeries (Maheshwari et al., 2012; Idowu & Adewole, 2015). For instance, before the COVID-19 pandemic, Abubakar et al. (2018) reported that 47% of Nigerian females traveling to India went to seek medical care and spent an estimate of over N41.6 billion ($260 million) on such trips. This trend has significantly increased in recent times due to poor healthcare funding in one's home country and a lack of universal health coverage (Onyeji, 2017; Orji et al., 2020). Being that the aviation industry plays a significant role in facilitating such trips, the importance of empirically examining the enplanement intention of female medical tourists is underscored.

Airline Cabin Design and Enplanement Intentions

Several studies have demonstrated that the design of an airline cabin could influence the intention of female passengers to select an airline. As mentioned in the introduction section, the decision to use an airline is conceptualized in this study as 'enplanement intention'.

Kurtulmusoglu et al. (2018) discovered that female travelers choose their airline based on three primary parameters- Cabin features, Cabin crew responsiveness and Cabin comfort. Some influential aspects of cabin features and responsiveness were employee competency, booking & reservation, and in-flight services. Though other characteristics such as on-time arrival, airfare, and flight frequency were taken into account, the former (cabin features) placed top for female passengers. Comfortable chairs, seat spaces and legroom, and flexibility in reservation changes service elements were the most significant sub-criteria for female passengers, according to the survey, which included a sample of roughly 1200 females. It's also worth noting that when it comes to airline company selection, 'cabin comfort' is the most important factor for female travelers.' That is, women have believed that comfortable chairs, seat space and legroom are top on the list of benefits they would appreciate the airline of choice to offer. Aksoy et al. (2003) supported this finding when their study revealed that cabin features were more important to female passengers. According to the authors, cabin layout also plays a role in the consideration for passengers' comfort, with an arrangement from single, twin or triple fuselage.

Another survey by Han (2013) was conducted in South Korea to determine if in-flight cabins and in-flight attributes such as space, function and ambient conditions influenced air travelers' behavioral intention to select and use low-cost international airlines. 54.4% of the 331 passengers surveyed were females who traveled internationally at least 6 times in 3 years. According to the findings from the structural equation model, air quality, temperature, layout, and equipment/amenities significantly stimulate favorable cognitive and affective evaluations and satisfaction, impacting passengers' positive behavioral intentions. While this statistical finding suggests that specific design attributes of an airline cabin can influence the behavioral intentions of passengers, the study was situated in the context of a developed country and was silent on the implication of cabin design features among female medical tourists.

With the aid of a video analysis software system (MVTA), Liu et al. (2019) observed, recorded and reconstructed the activities performed by passengers in a 2-hour simulated flight. They noticed that in economy class, passengers changed their postures frequently within a short time because they wanted to support their arms and body. They postulated that the main constraints of the passengers to do activities such as reading, sleeping/resting, and watching were mostly about the support and restricted space of seats like leg space, reclining seat and the armrest that is too narrow, hard, and cannot be adjusted (Greghi, Rossi & Menegon, 2012). According to their findings, cabin design elements such as seat arrangement, cabin layout, and activity arrangement can significantly reduce passenger discomfort (Liu et al., 2019). In the long run, these inconveniences cannot meet the service for the passengers and may affect future ticket purchasing behavior or enplanement intentions (Gilbert & Wong, 2003; Manski, 1990; Alards-Tomalin et al., 2014). These are instrumental factors needed in consideration of Airlines by passengers. Liu et al.*'s* (2019) study forms a strong base for understanding how various cabin design attributes affect satisfaction and enplanement intention, especially for short-haul flights. However, in addition to the small sample size (18) and underrepresentation of female passengers in the gender ratio (2 to 1), the study findings did not highlight the effects on female passengers, not to talk of medical tourists who most likely engage in a long-haul flight.

Regarding long-haul flights and passengers' preferences for airlines, Hunt and Truong (2019) surveyed a convenience sample of 1412 economy and premium economy passengers at Los Angeles and Seattle-Tacoma

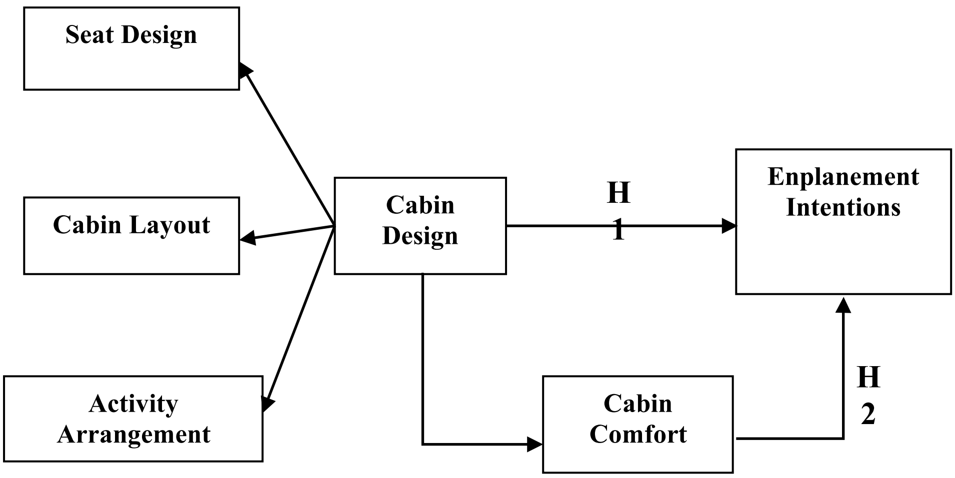
International Airports in the United States. The researchers considered five key variables: Cabin Operations, Flight Schedule, Onboarding, Comfort, Service Satisfaction, and Airfare. The findings from the exploratory factor analysis (EFA), confirmatory factor analysis (CFA) and Binomial logistic regression showed that Cabin Comfort was ranked as the second priority variable, which impacted the choice of low-cost, long-haul (LCLH) carrier. Airfare was ranked as the No 1 top priority during the Flight Schedule. While this study was not focused on gender, it is important to note that 52% of the passengers were females, with 69% traveling for tourism (vacation) purposes. Again, this underscores the need to examine the influence of cabin comfort on female tourists since they are more likely to take on medical tourism trips in foreign destinations. Based on the premises of these studies, we hypothesize that:

H1: In developing economies, cabin design (seat design, cabin layout, and activity arrangement) has a considerable impact on the future enplanement intentions of female medical tourists.

H2: The relationship between cabin design and female passengers' enplanement intentions is mediated by cabin comfort.

This relationship is represented in the conceptual model below (Figure 1).

Figure 1. Hypothesized relationships between cabin design, cabin comfort and enplanement intentions of female passengers



Source: Authors' conceptualization

As seen in Figure 1, the independent variable, Cabin Design, is measured by three elements- Seat Design, Cabin Layout, and Activity Arrangement. Hypothesis 1 (H1) suggests a direct causal relationship between cabin design and enplanement intentions. That is to say, the female medical tourists' enplanement intention could be a function of the design of the cabin. On the other hand, Hypothesis 2 (H2) suggests an indirect effect through a mediating variable- Cabin Comfort. This indicates that the enplanement intention could be a function of the comfort level created by the airline Cabin Design. These variables are further expounded on in the methodology section (3.1) of this paper.

Material and Methods

This study uses a mono-quantitative technique to conduct a causal-explanatory study. A field study was undertaken to effectively capture the extent and provide strong research on passenger experience with airplane cabin design, therefore the utilization of primary data. This research focuses on female travelers flying in economy class in underdeveloped nations, with an emphasis on West Africa. This region is selected because aggressive efforts are currently being undertaken by the Economic Community of West African States (ECOWAS) and relevant aviation authorities and policymakers to improve and sustain the development of the Aviation Industry in West Africa (ECOWAS, 2019). The sampling frame consists of female medical tourists. These include female passengers traveling for birth-related purposes, cosmetic surgery, dental care, fertility treatments, organ or tissue transplantation, and cancer treatment. As a result, females from ECOWAS nations like Nigeria, Benin Republic, Togo, Ghana, Ivory Coast, Mali, Senegal, Liberia, Sierra Leone, Gambia, Guinea, Guinea-Bissau, Cape Verde, Niger, and Burkina Faso are surveyed.

Due to the constraint of time and resources, a sample size of about 385 respondents was statistically derived using Cochran's (1963) formula for an unknown population (with a 95% confidence level). Also, for multivariate analysis, the rule of thumb on sample size has it that a minimum of 10 observations per variable is recommended (Ryan, 2013).

This study used the methodology used by Hunt and Truong (2019) and purposively selected respondents from a large, full-service online travel company's customer list. An online semi-structured questionnaire was used to collect data. Closed-ended questions with a 5-point rating scale (for quantitative data) and open-ended questions with a 5-point rating scale (for qualitative data) were included in the instrument. The approach used was motivated by a desire to investigate patterns and causal links and obtain a deeper understanding of the understudied topic. The rating ranged from 5 (very satisfied) to 1 (extremely dissatisfied). To avoid bias in responses, a "Don't Know" option (coded as 0) was included. During analysis, this is treated as a missing value.

The 31-item questionnaire contains two categories of measurement questions: the target questions and the classification questions. The target questions are those statements addressing the investigative questions of the study (Cooper & Schindler, 2011). The questions are adapted from existing aviation services studies. This research groups the target questions into topics representing the independent and dependent variables of the study. The question addressing the mediating variable is also part of the target questions. In addition to examining patterns in responses, the not-so-sensitive classification questions (socio-demographic variables) are used at the beginning of this study to serve as filters to determine whether a participant has the requisite knowledge to participate (Cooper & Schindler, 2011). The instrument was distributed online using Google forms and transcribed into English and French - the two major languages spoken in the West African region.

Variable Measures

The study variables were developed based on existing pre-validated scales by relevant studies which adopted rigorous experimental designs (flight simulation technique) (Liu et al., 2019). The independent variables are cabin design and cabin comfort, while the dependent variable is the enplanement intentions of female passengers. Key dimensions of ***Cabin design*** include Seat Design: comprising of the headrest, backrest, armrest, seating space, seat pitch, legroom, and seat width (Liu et al., 2019); Cabin Layout***:*** comprising of a number of seats, arrangement of seats, number of restrooms, location of the restroom, lighting, aisle pacing, size of the overhead bin (Liu et al., 2019; Aksoy et al., 2003); Activity Arrangement: comprising of sleeping and resting, reading, using small electrical devices, watching videos in flight, eating or drinking, talking with others (Liu et al., 2019). ***Cabin Comfort*** is measured in terms of overall comfort experienced in the cabin (Liu *et al.*, 2019). Finally, ***Enplanement Intention***, considered a consequence of satisfaction (Gilbert & Wong, 2003), is predictive of passengers' behavior (Manski, 1990). As a result, enplanement intentions may be a good indicator of airplane ticket purchasing behavior (Alards-Tomalin et al., 2014).

Data Analysis

This section provides statistical ground for proper decision-making and recommendation by strictly analyzing the statistics generated by R software using inferential and descriptive statistical methods. A total of 112 responses were received. However, after filtering the data based on gender and African nationality, only 57 valid responses were recorded. This is less than the estimated sample size of 385 respondents. While this sample size may limit the generalizability of the findings across the female medical tourist population, it is considered appropriate for making inferences as it is greater than 30 (according to the statistical rule of thumb). The analysis focuses on the use of the Ordinary Least Square Method "Multiple Regression Analysis" and significant test of statistics to justify the Model adopted and Hypothesis. The statistical software used for this project is R. R is a programming language and open-source (free) software environment for statistical computing and graphics.

Exploring the Data Set

The data set used in this study, as it is specified in R, is a tibble: 57 x 27, consisting of 57 rows of "respondents" and 27 columns of "variables". The variables are categorized into two groups- Target variables and Classification variables. Target variables are defined as the Dependent and Independent dummy characters in the model designed to capture what and how the respondents feel about a situation. Table 1 presents the descriptive statistics of the target variables. There are 22 target variables, with 21 being independent variables and 1 (enp_intention) being the dependent variable. The descriptive statistics of the target variables show that overall, the respondents responded positively to most of the items (median >3); however, legroom (sd_legroom) and no of restrooms (cl_restroomno) received negative reactions on average (median < 3). A closer examination showed no respondent provided a 5-point rating for both items.

Table 1. Descriptive statistics of target variables

	Vars	**N**	**mean**	**Sd**	**median**	**Min**	**max**	**range**
sd_headrest	1	57	2.964912	0.885698	3	0	5	5
sd_backrest	2	57	3.087719	1.022614	3	0	5	5
sd_armrest	3	57	3	1.035098	3	0	5	5
sd_seatspace	4	57	2.701754	0.944248	3	1	5	4
sd_seatpitch	5	57	2.947368	0.874664	3	0	4	4
sd_legroom	6	57	2.526316	0.983893	2	1	4	3
sd_seatwidth	7	57	3.105263	1.029636	3	0	5	5
cl_seatnumber	8	57	3.175439	0.868554	3	1	5	4
cl_seatarrange	9	57	3.052632	0.854004	3	1	4	3
cl_restroomno	10	57	2.473684	0.965573	2	0	4	4
cl_restroomloc	11	57	3.298246	0.801002	3	1	4	3
cl_lighting	12	57	3.754386	0.434277	4	3	4	1
cl_aisle	13	57	3.017544	0.876096	3	1	4	3
cl_luggage	14	57	3.263158	0.935917	4	0	4	4
aa_sleeping	15	57	2.807018	0.971718	3	1	5	4
aa_reading	16	57	3.403509	0.775971	3	2	5	3
aa_deviceuse	17	57	3.105263	1.144618	3	0	5	5
aa_videoswatch	18	57	3.701754	0.962974	4	0	5	5
aa_eatdrink	19	57	3.105263	0.957754	3	1	5	4
aa_talking	20	57	3.385965	0.619746	3	2	5	3
cabin_comfort	21	57	3.245614	0.7856	3	2	5	3
enp_intention	22	57	3.561404	0.886759	4	1	5	4

Classification variables are the dummy characters in the model; they are designed to capture the biodata of the respondents. All 57 valid responses (100%) came from females, with 100% being Nigerians. All the responses were anonymous, as personal names were not collected. Although emails were obtained, they were optional and were only provided by respondents who were interested in knowing the findings of the study. 38.6% of the respondents were between the ages of 18 and 35 years; 59.6% were between the ages of 36 and 55 years; only one respondent (1.7%) was more than 55 years old. This indicates that the responses came from individuals with the ability to make flight purchase decisions. The educational qualifications revealed that 14 respondents (24.6%) had Bachelor's degrees, while 43 respondents (75.4%) had post-graduate degrees. This suggested that the respondents were knowledgeable enough to understand and respond to the questions. On the frequency of flight, 35 respondents (61.4%) reported that they flew less frequently; 11 (19.3%) flew more frequently, and 11 (19.3%) rarely flew. Furthermore, the data exploration revealed the existence of Outliers of 12 non-responses from 9 respondents.

Multicollinearity

The value of the pairwise correlation matrices showed that the values of the relationship established were very low "<.9"; hence the regression modeling was free from the multicollinearity problem, and predictions can be assumed satisfactory.

Regression Output

To effectively evaluate the performance of the regression model, it is ideal to split the dataset into train and test sets. The "training" data set refers to the samples used to create the model, while the "test" data set is used to validate model performance. The output result is based on the test of two data sets observed from the survey report. The reports are classified under two model outputs:

- Model1 (Train dataset)
- Model2 (Test dataset)

Since the dataset was too small to divide into two parts without each part being less than 30 sample elements, the outliers identified during the data exploration phase were used as the basis for the split. Model 1 uses the data set tibble: with 57col x 20row. This dataset contained the nine identified outliers. Model 2 uses the data set tibble: with 48col x 20row. For this dataset, the nine identified outliers were expunged.

OUTPUT 1

MODEL 1 Summary:

Call: lm(formula = enp_intention ~ sd_headrest + sd_backrest + sd_armrest + sd_seatspace + sd_seatpitch + sd_legroom + sd_seatwidth + cl_seatnumber + cl_seatarrange + cl_restroomno + cl_restroomloc + cl_lighting + cl_aisle + cl_luggage + aa_sleeping + aa_reading + aa_deviceuse + aa_videoswatch + aa_eatdrink + aa_talking)

Table 2. Coefficients of model 1

(Intercept)	sd_headrest	sd_backrest	sd_armrest	sd_seatspace	sd_seatpitch
1.83242	-0.02518	0.32041	0.15572	0.07549	-0.31638
sd_legroom	sd_seatwidth	cl_seatnumber	cl_seatarrange	cl_restroomno	cl_restroomloc
0.37249	0.27837	-0.02434	-0.06738	-0.15005	0.33305
cl_lighting	cl_aisle	cl_luggage	aa_sleeping	aa_reading	aa_deviceuse
-0.29181	0.07258	-0.04116	0.09154	-0.07803	0.00392
aa_videoswatch	aa_eatdrink	aa_talking			
0.05816	0.24924	-0.34140			

MODEL2 Summary:

Call: lm(formula = enp_intention ~ sd_headrest + sd_backrest + sd_armrest + sd_seatspace + sd_seatpitch + sd_legroom + sd_seatwidth + cl_seatnumber + cl_seatarrange + cl_restroomno + cl_restroomloc + cl_lighting + cl_aisle + cl_luggage + aa_sleeping + aa_reading + aa_deviceuse + aa_videoswatch + aa_eatdrink + aa_talking)

Table 3. Coefficients of model 2

(Intercept)	sd_headrest	sd_backrest	sd_armrest	sd_seatspace	sd_seatpitch
1.83242	-0.02518	0.32041	0.15572	0.07549	-0.31638
sd_legroom	sd_seatwidth	cl_seatnumber	cl_seatarrange	cl_restroomno	cl_restroomloc
0.37249	0.27837	-0.02434	-0.06738	-0.15005	0.33305
cl_lighting	cl_aisle	cl_luggage	aa_sleeping	aa_reading	aa_deviceuse
-0.29181	0.07258	-0.04116	0.09154	-0.07803	0.00392
aa_videoswatch	aa_eatdrink	aa_talking			
0.05816	0.24924	-0.34140			

OUTPUT 2

MODEL1

Call:

```
## lm(formula = enp_intention ~ sd_headrest + sd_backrest + sd_armrest +
##     sd_seatspace + sd_seatpitch + sd_legroom + sd_seatwidth +
##     cl_seatnumber + cl_seatarrange + cl_restroomno + cl_restroomloc +
##     cl_lighting + cl_aisle + cl_luggage + aa_sleeping + aa_reading +
##     aa_deviceuse + aa_videoswatch + aa_eatdrink + aa_talking)
##
```

Table 4. Model 1 regression residuals and coefficients

Min	1Q	Median	3Q	Max
-1.49061	-0.27727	0.05217	0.30564	0.96963

Coefficients:	**Estimate**	**Std. Error**	**t value**	**Pr(>|t|)**
(Intercept)	1.83242	1.10570	1.657	0.1062
sd_headrest	-0.02518	0.13017	-0.193	0.8477
sd_backrest	0.32041	0.12121	2.643	0.0121
sd_armrest	0.15572	0.10760	1.447	0.1565
sd_seatspace	0.07549	0.13644	0.553	0.5835
sd_seatpitch	-0.31638	0.14130	-2.239	0.0314
sd_legroom	0.37249	0.13817	2.696	0.0106
sd_seatwidth	0.27837	0.12458	2.234	0.0318
cl_seatnumber	-0.02434	0.13297	-0.183	0.8558
cl_seatarrange	-0.06739	0.15568	-0.433	0.6677
cl_restroomno	-0.15005	0.11982	-1.252	0.2185
cl_restroomloc	0.33305	0.14730	2.261	0.0299
cl_lighting	-0.29181	0.24709	-1.181	0.2453
cl_aisle	0.07258	0.15313	0.474	0.6384
cl_luggage	-0.04116	0.12173	-0.338	0.7372
aa_sleeping	0.09154	0.12352	0.741	0.4634
aa_reading	-0.07803	0.13488	-0.579	0.5665
aa_deviceuse	0.00392	0.08963	0.044	0.9654
aa_videoswatch	0.05816	0.12186	0.477	0.6360
aa_eatdrink	0.24924	0.11791	2.114	0.0415
aa_talking	-0.34140	0.18434	-1.852	0.0722

```
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 0.6354 on 36 degrees of freedom
## Multiple R-squared:   0.67,  Adjusted R-squared:  0.4866
## F-statistic: 3.654 on 20 and 36 DF,  p-value: 0.0003542
```

MODEL2

```
## Call:
## lm(formula = enp_intention ~ sd_headrest + sd_backrest + sd_armrest +
##     sd_seatspace + sd_seatpitch + sd_legroom + sd_seatwidth +
##     cl_seatnumber + cl_seatarrange + cl_restroomno + cl_restroomloc +
##     cl_lighting + cl_aisle + cl_luggage + aa_sleeping + aa_reading +
##     aa_deviceuse + aa_videoswatch + aa_eatdrink + aa_talking)
##
```

Table 5. Model 1 regression residuals and coefficients

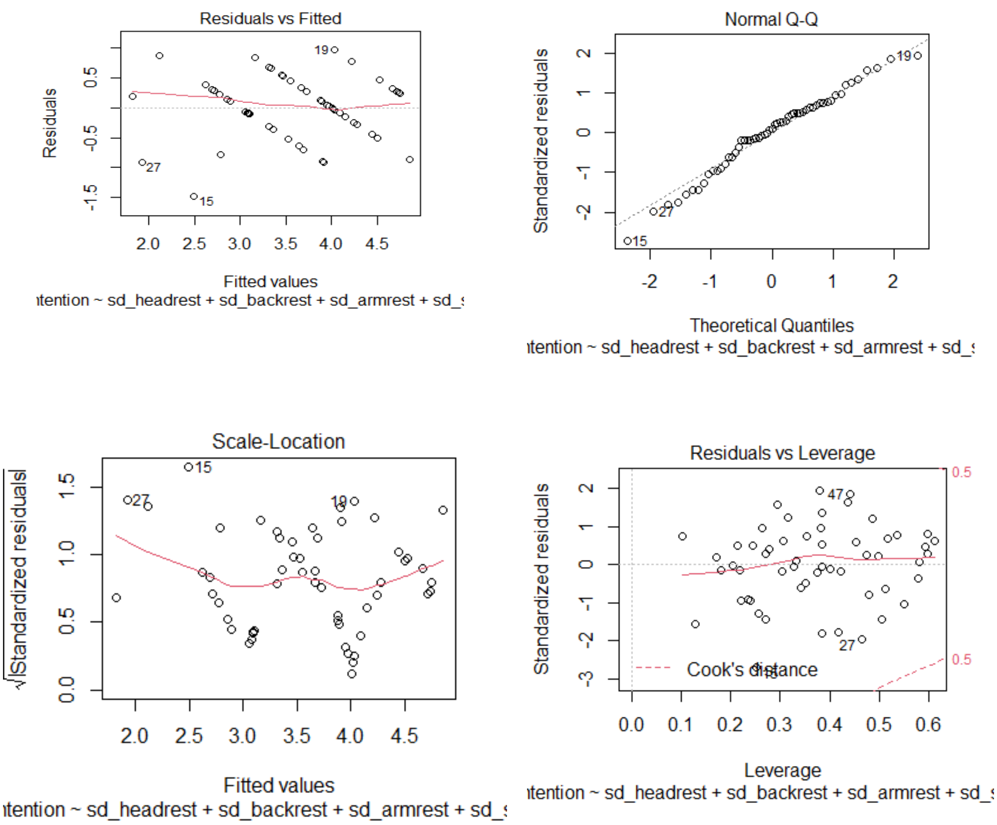
Min	1Q	Median	3Q	
-1.36191	-0.37506	-0.00218	0.29651	
Coefficients:	**Estimate**	**Std. Error**	**t value**	**Pr(>|t|)**
(Intercept)	1.047932	1.386613	0.756	0.4563
sd_headrest	-0.163396	0.170187	-0.960	0.3455
sd_backrest	0.324324	0.160232	2.024	0.0530
sd_armrest	0.223888	0.140246	1.596	0.1220
sd_seatspace	0.125635	0.172290	0.729	0.4722
sd_seatpitch	-0.281111	0.210076	-1.338	0.1920
sd_legroom	0.454404	0.167989	2.705	0.0117
sd_seatwidth	0.240542	0.144539	1.664	0.1076
cl_seatnumber	0.062887	0.161952	0.388	0.7008
cl_seatarrange	-0.224636	0.184976	-1.214	0.2351
cl_restroomno	-0.189350	0.157196	-1.205	0.2388
cl_restroomloc	0.437725	0.175759	2.490	0.0192
cl_lighting	-0.213996	0.307936	-0.695	0.4930
cl_aisle	0.133371	0.167402	0.797	0.4326
cl_luggage	-0.003422	0.168968	-0.020	0.9840
aa_sleeping	0.078604	0.165460	0.475	0.6386
aa_reading	-0.090095	0.154083	-0.585	0.5636
aa_deviceuse	-0.162583	0.141095	-1.152	0.2593
aa_videoswatch	0.106253	0.187905	0.565	0.5764
aa_eatdrink	0.241090	0.141026	1.710	0.0988
aa_talking	-0.204865	0.225003	-0.911	0.3706

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
Residual standard error: 0.65 on 27 degrees of freedom
Multiple R-squared: 0.6814, Adjusted R-squared: 0.4455
F-statistic: 2.888 on 20 and 27 DF, p-value: 0.005479

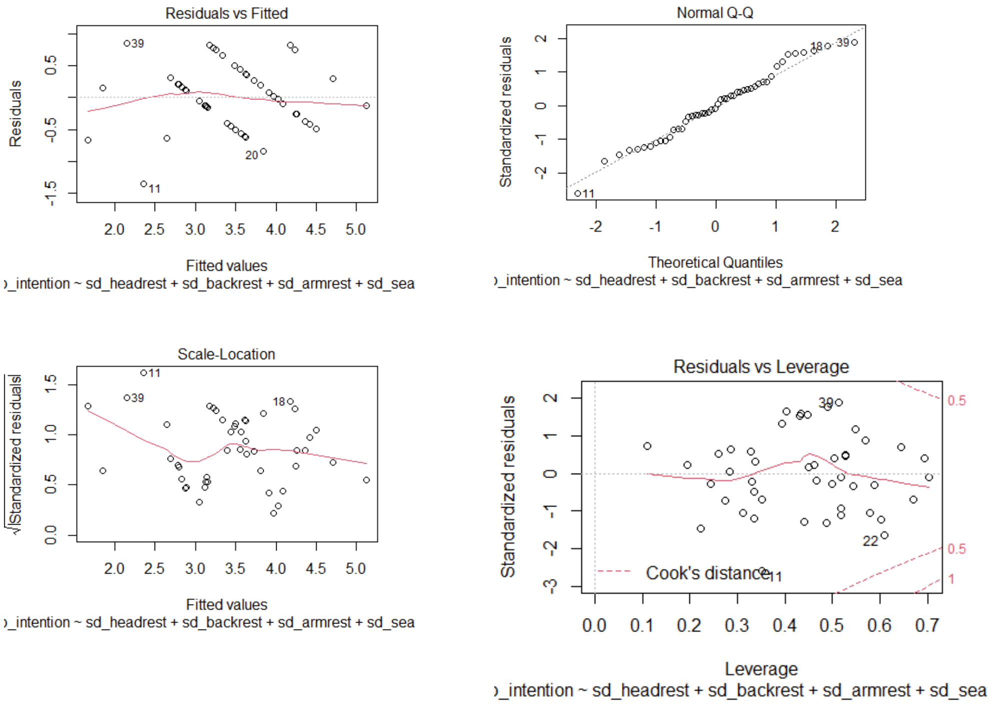
Checking for Homoscedasticity

This section visualizes and reviews the patterns of residual errors in the model using a graphical display; it is important to define the patterns of error in the model in order to justify the assumption regression analysis about homoscedasticity "equal variance". Below is the generated output from R. From the graphical display, it is well visualized that the regression models (1 & 2) are free from the problem of heteroscedasticity.

MODEL1



MODEL2



Interpreting the Regression Output

Model 1: Coefficient Estimates for the independent variables with positive values indicate that every 1 percent increase in cabin design will lead to an estimated value percentage increase of the enplanement intention. That is to say, as the cabin design improves, the intention to use an airline increases. At the same time, Coefficient Estimates for the independent variables with negative values indicate that every 1 percent increase in the cabin design will lead to an estimated value percentage decrease of the enplanement intention. In other words, as the cabin design improves, the intention to use an airline decreases. Hence, we can conclude that the independent variables with negative coefficient values have no significant effect on the choice of using an airline over and over again. Furthermore, among the coefficients with positive values, a statistical test was used to determine those that had a more significant effect on enplanement intentions. From the Model 1 table (Table 2), the independent variables "sd_backrest, sd_seatpitch, sd_seatwidth, aa_eatdrink, sd_legroom and cl_restroomloc" are considered to have a more significant effect on the enplanement intention. These conclusions are drawn from the comparison of the p-value of these estimates being less than the significant value of alpha "0.05".

Model 2: Coefficient estimates for the independent variables with positive values indicate that every 1 percent increase in the cabin design will lead to an estimated value percentage increase of the enplanement intention. That is to say, as the cabin design improves, the choice of selecting an airline increases. While Coefficient Estimates for the independent variables with negative values indicate that every 1 percent increase in the choice of cabin design will lead to an estimated value percentage decrease of the enplanement intention. In other words, as the cabin design increases, the choice of selecting an airline decreases. Hence, it can be concluded that the independent variables with negative coefficient values have no significant effect on the choice of using an airline over and over again. Furthermore, among the coefficients with positive values, a statistical test was used to determine those that had a more significant effect on the enplanement intention. From the Model 2 table (Table 3), the independent variables "sd_legroom and cl_restroomloc" are considered to have a more significant effect on the enplanement intention. This conclusion is drawn from the comparison of the pvalue of these estimates being less than the significant value of alpha "0.05".

Determining the Model of Best Fit

- The two models are significantly fit for our study, but MODEL1 will be considered for this study because the F value, which measures the overall MODEL significance, is higher than that of MODEL2.
- From the regression output, it is observed that MODEL1 is capable of visualizing more independent variables that have a more statistically significant effect on enplanement intention.
- Hence based on MODEL 1, we can statistically conclude that the independent variables which significantly pose more effect on enplanement intentions are; "sd_backrest, sd_seatpitch, sd_seatwidth, sd_legroom, aa_eatdrink, and cl_restroomloc", which are components of Seat Design, Cabin Layout and Activity Arrangement.

Defining the Mediating Effect of Cabin Comfort

As illustrated in the conceptual model (figure 1), the relationship between the independent variable (cabin design) and the dependent variable (enplanement intention) is hypothesized to be an indirect effect caused by the influence of the third variable in mediation (the mediator- cabin comfort). The regression results have shown the significant predictors to be sd_backrest, sd_seatpitch, sd_seatwidth, sd_legroom, aa_eatdrink, and cl_restroomloc. The indirect effects of these variables on enplanement intention are checked with the introduction of a mediator- Cabin Comfort.

Table 6 below compares three methods for determining the significance of indirect effects: Sobel's test, Aroian's test, and Goodman's test. The differences in these three tests are due to differences in standard error computation methods (Nwankwo & Igweze, 2016).

Table 6. Mediating effect of cabin comfort on cabin design and enplanement intention

		Sobel	Aroian	Goodman
sd_backrest	z.value	2.608442684	2.56425219	2.654999504
	p.value	0.009095524	0.01033984	0.007930853 *
sd_seatpitch	z.value	2.730902633	2.688510478	2.77536548
	p.value	0.006316113	0.007177158	0.00551397 *
sd_seatwidth	z.value	1.71762197	1.67397091	1.76487617
	p.value	0.08586559	0.09413632	0.07758458
sd_legroom	z.value	2.08422676	2.03138698	2.14141672
	p.value	0.03713955	0.04221575	0.03224045 *
cl_restroomloc	z.value	1.5606367	1.5221156	1.6022388
	p.value	0.1186095	0.1279801	0.1091028
aa_eatdrink	z.value	0.7365636	0.7196595	0.7547176
	p.value	0.4613878	0.4717347	0.4504184

As seen from Table 6, the Sobel, Aroian, and Goodman tests yielded the same result in all cases. The results showed that cabin comfort produced a significant mediating effect on enplanement intention for only three variables. These include sd_backrest (p.value 0.009095524 <0.05); sd_seatpitch (p.value 0.006316113 < 0.05); and sd_legroom (p.value 0.03713955 < 0.05). That is to say, enplanement intention is significantly determined by the comfort the passenger experiences through the three variables- backrest, seat pitch and legroom.

On the other hand, the p.values of sd_seatwidth (0.08586559 > 0.05); cl_restroomloc (0.1186095 > 0.05) and aa_eatdrink (0.4613878 > 0.05) indicate that cabin comfort does not produce a significant mediating effect on cabin design and enp_intention for these variables. In other words, enplanement intention is not significantly determined by the seat width, restroom location and eating and drinking in the presence of a mediating variable (cabin comfort).

Discussion of Findings

> *H1: In developing economies, cabin design (seat design, cabin layout, and activity arrangement) has a considerable impact on the future enplanement intentions of female medical tourists.*

From the statistical analysis, the independent variables that have a significant effect on enplanement intentions are the backrest, seat pitch, seat width, legroom, eating or drinking, and location of restrooms. These items are components of Activity Arrangement, Cabin Layout and Seat Design, with most of the elements coming from Seat Design (backrest, seat pitch, seat width, legroom). Considering Model 2, which was free of outliers, only legroom and restroom location had a significant effect on intention, with legroom having a larger effect. This finding supports that of Kurtulmusoglu et al. (2018), which showed that legroom was one of the most significant sub-criteria female passengers looked out for when choosing an airline based on its design. This is not to downplay the effect of restroom location and food on enplanement decisions, as projected from the survey by Han (2013). In addition to seat designs, these factors play a significant role as most female tourists would eat, especially if the flight were a long haul. The restroom location plays a role as most females preferred closer proximity to their seats.

Overall, the emphasis on seat designs is not surprising as the open-ended responses revealed that 43.2% of the 44 responses pointed to legroom being the aspect of the airline cabin seat design that influenced their comfort. This was followed by seat spacing (29.5%); headrest (11.4%); armrest (9.1%); and backrest (6.8%). While one respondent explained that "seats have become a bit wider and headrests have become easier to adjust; well, better in some aircraft than others", many felt that "leg room was too small" or was not enough, especially for tall people; thereby making them feel "cramped in the seat" for journeys of more than two hours. Some expressed that they wish to adjust their seat to avoid physical contact with passengers beside, behind and in front of them. These confirm the findings by Aksoy et al. (2003) that seat design is a major determinant of comfort in aircraft cabins.

To reduce the dilemma of which specific model to adopt, a stabilizing factor is necessary. As Kurtulmusoglu et al. (2018) demonstrated, female aviation passengers are concerned about their safety and comfort level within the cabin. Based on this, it is ideal for passengers' comfort to be considered as a mediator between cabin design and enplanement intention. This served as a stabilizing factor for the models.

H2: The relationship between cabin design and female passengers' enplanement intentions is mediated by cabin comfort.

After testing the six significant variables (backrest, seat pitch, seat width, legroom, eating or drinking, and location of restrooms), the mediation results confirm that out of all three elements of cabin design (Activity Arrangement, Cabin Layout and Seat Design) as proposed by Liu et al., (2019), Seat Designs has the most significant effect on enplanement intention of female medical tourist. This is because only the backrest, seat pitch and legroom were statistically significant.

Interestingly, the open-ended responses on activity arrangement were linked to the comfort obtained from Seat design. Even though few responses were on the food quality, some respondents acknowledged that they were very uncomfortable eating and drinking in the cabin because the seats were too close to each other. One respondent expressed dissatisfaction with the eating and drinking activity arrangement due to the cabin crew knocking her with a trolley. Two others pointed to the uncomfortable headrest and hard seats, which made activities such as sleeping on flight really uncomfortable. Drawing from the study by Hunt and Truong (2019), when the trips are long, these discomforting experiences significantly affect female choices of the carrier even when the airfare are low-cost.

From the open-ended response on Cabin layout, more than 70% of the open-ended responses were on discomfort experienced from cramped features such as (tight legroom, cramped seating arrangement, and small aisle spacing). Others were centered on a few restrooms, which resulted in long queuing times. The aisle should be wide enough to allow for two passengers to walk without one having to step aside for the other. One particular comment from the medical tourist was that obese and aged passengers find it difficult to move to the restroom area as a result of cramped seats and aisle spacing.

While embarking on flights, female medical tourists are concerned about their comfort and safety in the cabin. Aviation researchers emphasized that aircraft cabins are designed to provide comfort to passengers, and it is a measure of the efficiency of the airline (Hall, 2013; Liu et al., 2017). Their study showed that passengers were satisfied based on the level of comfort they experienced in flight. For female medical tourists, the comfort experience is greater when it comes to seat design. They are more influenced by the comfort they feel from the backrest, seat pitch and legroom. These are basic anthropometrics design elements in aviation, as revealed by the simulation experiment of Liu et al. (2019). This evokes an inquiry into the relationship between seat design and female tourist enplanement intention.

Conclusion

The cabin of an aircraft, according to Liu et al. (2019), is a highly restricted place in which passengers are not authorized to leave their seats and engage in random activities. Passengers become uncomfortable after long periods of sitting and must change their postures and activities regularly. This study found that the amount of comfort customers have in the aircraft cabin has a significant impact on their airline purchase choice. Being that the aviation and travel industry was greatly affected by the Covid-19 pandemic, it is only critical for airline businesses to seek ways of surviving. After the pandemic, upon re-opening of geographical borders by countries, travel will commence. There will be a need for new and existing passengers to re-examine their aviation service decisions. Already, passengers recognize the need for travel after the pandemic and would likely find themselves at the early stages of the purchase decision processes (particularly, information search and evaluation of alternatives).

On the other hand, aviation service providers will find themselves in serious competition for customers' attention, post-pandemic. This behooves airline service providers to take advantage of passengers' travel needs and decision-making processes. This study has shown the need for seat designs to be more flexible such that passengers can adjust their backrest, seat pitch and legroom without discomforting passengers at the rear. As the findings from the models have shown, medical tourists who are women or identify as women would greatly consider seat design features (backrest, seat pitch, seat width and legroom) before returning as a customer. While economy class seating in airlines is not designed to be completely comfortable, airlines that provide passengers the option to upgrade their tickets to include certain adjustable seat elements are likely to be among the top contenders when it comes to enplanement decision-making.

Recommendations for Airline Design and Marketing

The research found that seat design (backrest, seat pitch, seat breadth, and legroom) received the greatest replies in the research survey data, influencing activity arrangements such as eating and drinking. This calls for diligent attention and efforts by airlines to redefine their services regarding cabin comfort for female medical tourists. This would give the airline an edge over competitors. An analysis to optimize the anthropometric requirement in seat design regarding female medical tourists would increase patronage of female tourists. Consequently, emotional, psychological and physical attachment or attraction to the airline would be created.

Therefore, it is recommended that airlines remodel seat design to be flexible, specifically for medical tourists. Incorporating these specific seat features in new aircraft models and adapting these to the needs of female medical tourists would help ensure efficiency and sustainability in the African aviation market. Also, airlines with few fleets can have a separate section in the craft designed to accommodate female medical tourists' needs.

Considering the impending competition after the pandemic, aviation firms should carve a niche for themselves to be profitable by adopting a health theme or undertone. Airline marketers can key into the health needs of passengers by projecting their brand as being health-conscious. That is, they can encourage passengers with health needs to fly with the brand; and emphasize the comfort experience using these three specific cabin elements as a value proposition.

A sample sales copy for this service would be:

> *Your health is a worry enough … Your Seat shouldn't be!*
>
> *Fly Air XYZ for that desired comfort. Take advantage of our unique seats designed to customize your comfort experience.*

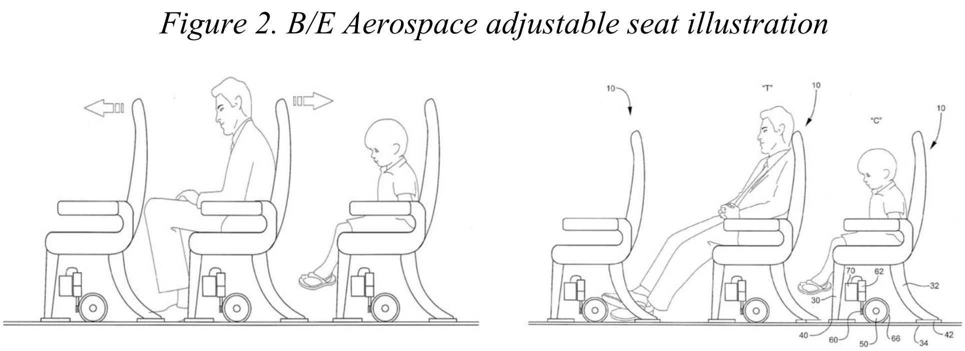
Customize your Comfort! Fly Air XYZ

Limitations of the Study and Suggestions for Future Research

The major limitation of the study is the relatively small sample size compared to the population. This was due to the need to effectively utilize the limited resources available for this project. No funding was received for this project. With significant funding, this project possesses the potential to inform post-pandemic marketing, tourism, engineering and architectural practice in the aviation industry. With such funding, a more pragmatic approach and longitudinal approach will be undertaken to enhance the generalizability of the findings. The findings will inform post-pandemic aviation practice towards the growth of the tourism and travel market in Africa.

Seeing that seat design was identified as the most significant aspect of cabin design for female medical tourists, future research is encouraged to validate the findings by assessing the relationship between seat design and female tourist enplanement intention. Design engineering researchers can undertake a simulation experiment to prototype an adjustable aviation seat design. This model should be controlled by a digitally-held device. Nevertheless, the focus should be on legroom improvement for taller people (Zhang, 2015). Future product improvement should design seats that, within a few seconds, allow for the adjustability of the backrest, seat pitch, seat width and legroom without disturbing passengers in front, rear and on the side. The role of artificial intelligence in achieving such cabin design should be explored. These will inform future models of aircraft cabin design and capture the interest of airline clients.

Figure 2. B/E Aerospace adjustable seat illustration



Source: Zhang (2015).

Data Availability

The primary survey data used for this study and the R Markdown (.Rmd) are available from the corresponding author upon request.

Conflicts of Interest

The authors declare no conflicts of interest.

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Article history: Received: January 24th, 2022

Accepted: December 12th, 2022