

Malaysian Public Perception on Passenger Standing Cabin for Commercial Transport Aircraft in Domestic Flights

Norhafizah Dasuki, Fairuz I Romli

Abstract: *With the increase in market competition among the airlines today, many of them are looking for new alternative ways to reduce the cost for their flight operations in order to offer more affordable flight services. One of the proposals that have been put forward is passenger standing cabin concept, which is expected to increase cabin capacity and reduce flight cost per passenger per flight. The perception and also reception of the Malaysian public regarding the potential implementation of this new standing cabin concept by the domestic airlines are explored through conducted public survey. The survey has been carried out at two key domestic hub airports for local low-cost airlines in Malaysia: Sultan Abdul Aziz Shah Airport and Kuala Lumpur International Airport 2. From the collected data, the Malaysian public responses are taken as encouraging and this finding highlights the existence of market demands for this standing cabin concept. The support for this new cabin idea appears to be dependent on the social demographic background of the public, with age, gender and income level are among some of the main indicators. Several factors that could improve the market acceptance of this new cabin concept are also established from the survey data such as ticket price, comfort and safety aspects.*

Index Terms: *low-cost airlines, market perception, passenger cabin design, public survey, standing cabin*

I. INTRODUCTION

Air transportation has become a main means of transport for many people in the recent years and this has been evident from the increased numbers of people flying with the current airlines. The International Air Transport Association (IATA) has projected that the airlines industry would serve around 3.6 billion passengers worldwide in year 2016, with more than 61% of them are for the domestic flights [1]. The rise in the numbers of passengers, especially for domestic flight markets, can be related to the progressive success of low-cost airlines throughout the world. A key factor that differentiates low-cost airlines and their full-service counterparts is their offering of a lower ticket price that enables them to attract new passengers who might feel that flying services have now been made more affordable and accessible to them. Low-cost airlines typically operate with much reduced cost in order to offer the lower air fares, which sometimes can be cheaper than that of available ground transport options for the same travel trip. In essence, the low-cost operational model that has been pioneered by the now-defunct Pacific South West Airlines has been followed by a few other airlines such as Southwest Airlines in 1973 [2].

In 2011, there are already 109 carriers worldwide that can be classified as low-cost airlines and majority of their operations are within Europe and Asia [3]. In Malaysia, the market entry of AirAsia, a local low-cost airline, has provided a massive market competition to Malaysia Airlines, national full-service airline that has enjoyed domestic market monopoly prior to that. With a slogan "Now Everyone Can Fly", AirAsia today has become as one of the most influential airlines in the Asian region. Its offering of low flight fares has made the air travel become more affordable to growing proportion of Southeast Asia's middle class. The local Malaysian air transportation has transported more than 86 million passengers in 2015 [4], which could be certainly contributed to the rise of domestic low-cost airlines such as AirAsia and Malindo Airlines. With the trend showing more and more people are keen to travel by air due to cheaper flight tickets, the main challenge for low-cost airlines is to keep their fares competitively low amid rising jet fuel and other operational costs. In general, the operation of the low-cost airlines requires a high breakeven passengers' load factor for each serviced flights since they are charging competitively lower fares. Hence, it is not surprising that most low-cost airlines have been actively searching for new innovative ways that could enable them to reduce their operational expenses while maintaining their level of market competitiveness. In terms of passenger cabin designs, several revolutionary proposals have been made to increase cabin capacity of the existing aircraft. This follows a notion that the flight cost per passenger can be effectively reduced by having more passengers onboard per flight. Aviointeriors Company, one of the leading aircraft seat and interiors manufacturers in the world, has designed and developed new ultra-high density aircraft passenger seat known as the SkyRider [5]. The seat, which supposedly feels like sitting on a saddle, is targeted for potential creation of new seating class below current economy seating class. By reducing the seat pitch to only just 23 inches, airlines will be able to cram more passengers into their aircraft cabin. Furthermore, Airbus, one of the world's major aircraft manufacturers, has also recently patented a new revolutionary type of passenger seat that has been dubbed as "bicycle seat" [6]. Despite acknowledging the possible discomfort that many passengers would experience during flight with such kind of seat, Airbus nonetheless strongly believes that the number of seats in passenger cabin has to inevitably increase in order to maximize financial returns for the airlines. Back in year 2002,

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Airbus has considered the idea of standing passenger cabin for their aircraft and already patterned a design concept for it (Patent No. US 6,467,728 B2). This standing cabin, as it is also known today, is envisioned to replace current seats with vertical passenger supports that are equipped with shoulder harnesses and also arm rests. In this cabin concept, passengers are expected to be in standing position throughout the whole flight, which enables the accommodation of more passengers inside the cabin space. Unlike other proposed designs of high density cabin seats for use in the commercial transport aircraft, standing cabin concept seems more practical and comfortable to the passengers. Lately, there have been few re-emerging high interests on standing cabin concept. Spring Airlines, a low-cost airlines in China, has reiterated their interest to implement this passenger cabin concept [7] and VivaColumbia, another low-cost airline, has shown similar interest [8]. Among others, they join other low-cost airlines that have shown interests on this new cabin concept including Ryanair and Tiger Airways. Taking the cue from the positive market interest, this study aims to establish market perception on future implementation of the standing cabin concept in the commercial domestic flights in Malaysia through a conducted public survey. Such assessment of public opinion prior to market introduction of any product or service is typically done to ensure market success. The survey method has been commonly used to obtain the market responses for the introduction of new transportation type or service such as electric motorcycle in Taiwan [9], high-speed rail linking the big cities in Australia [10], autonomous vehicles [11], electric vertical takeoff and landing flight services [12] and in-flight food delivery and waste collection services [13]. The survey results are useful in providing some insights on future market potential and expected criteria from passengers with regards to this new cabin concept implementation.

II. STANDING CABIN CONCEPT

Standing cabin is one of the proposed innovative concepts of aircraft cabin design where the passengers are transported in their standing position throughout the entire flight instead of in seated position. A graphical depiction of standing cabin concept that is considered for this study is illustrated in Fig. 1.

This cabin concept is not exactly a new idea. Inspired by the ground transportation modes like buses and trains, this idea has been around since early 2000s. Among the first airlines to seriously approach this cabin design is Spring Airlines, which has been exploring this cabin idea to introduce standing-room only for some of their Airbus A320 aircraft fleet. This cabin concept is projected to increase cabin capacity by about 40% than conventional cabin design and subsequently reduce the cost by as much as 20% [14]. Such advantages would be very beneficial to the low-cost airlines. Ryanair, a low-cost airline in Europe, has taken up the idea and pushed for approval from the aviation authorities. In 2012, the airline has successfully obtained the approval to operate a series of 100 trial flights, where several back rows of seats inside their passenger cabin are removed to accommodate up to 50 standing passengers for one-hour flights [15]. It is good to acknowledge that, in terms of regulations, the standing cabin concept is legal by current standards of aviation authorities, provided that the passengers are properly secured by a certified mechanism.

Despite its potential, the pursuit and development of this standing cabin concept has made very little progress over the years since its inception. Apart from some patents, no formal research study has been reported and made available in the public domain by other researchers. Therefore, this is a clear research gap that has to be addressed before implementation of standing cabin concept can be seriously considered by the commercial transport airlines. Previous preliminary studies by the authors have been focused on feasibility and viability of this cabin concept, and it is found that it can theoretically increase cabin capacity by up to 21% and potentially reduce flight ticket price by more than 17% [17]. Such advantages are very much appealing to low-cost airlines. In addition, an ergonomic study that has been done highlights that standing posture during flight does not pose significantly higher health risk to the passengers compared to the current seated posture for short range flights [18]. For comfort and health purposes, the recommended flight duration for aircraft with the standing cabin is between one to two hours only, which suits many of the domestic flight routes in Malaysia.

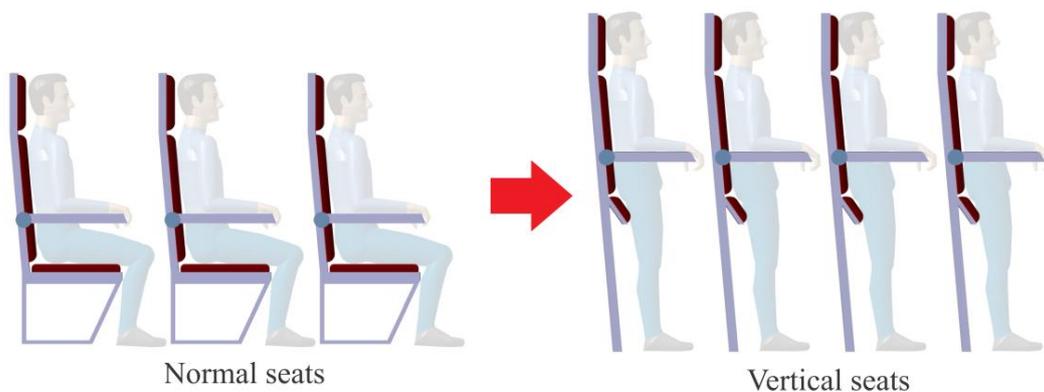


Fig. 1. Transformation of conventional cabin into full-standing cabin [16]

III. PUBLIC SURVEY ON STANDING CABIN CONCEPT

Conducting survey is one of the ways to obtain unbiased information to assist in the decision making process. In this research study, design and conduct of the survey have been made with reference to Kitchenham and Pfleeger (2002) [19, 20]. This study applies the quantitative method based on a structured self-administered questionnaire while convenience sampling method is used in selection of survey respondents based on the time constraints and also accessibility to them. By definition, convenience sampling, which is also known as haphazard or accidental sampling, is a type of non-probability or non-random sampling where survey respondents who meet certain target criteria and willing to participate are included [21]. A similar sampling technique has been applied in many other studies including one that measures the impact of the airlines service quality on customer loyalty [22]. Because the convenience sampling method is applied, the location where the survey is conducted plays a big role in assuring the quality of the available survey respondents. In this study, the public survey has been conducted in two primary local airports in Malaysia: Kuala Lumpur International Airport 2 (KLIA2) and also Sultan Abdul Aziz Shah Airport. These two airports have been chosen as venues to conduct the public survey because they are main operating domestic hubs for low-cost airlines in Malaysia. Therefore, the target survey respondents available at the airports are highly suitable for this study because many of them are frequent passengers of such airlines. The survey has been conducted in two separate sessions for one to two weeks at each location, both on weekends and weekdays, and also during peak and off-peak hours. The peak hours here are assumed to be between 10am to 6pm when the departures and arrivals of most flights are scheduled at the terminals.

Overall, the survey instrument used consists of 16 different questions and most of them are of multiple-choice type. The proposed number of sample size for a confidence interval of 95% is about 1000 respondents, provided the population size of 86 million local air travelers. In this study, the total number of respondents is 1000 from these two locations and some of the pictures during the conduct of the survey are shown in Fig. 2. A short introductory explanation on the standing cabin has been given to all survey respondents to ensure that they have proper understanding of the proposed concept before giving their feedback through the survey.

In general, questions in the survey are essentially grouped into four sections. The first section deals with the respondents' demographic information such as their age, gender, etc. This information is used to classify the representative group of the respondents within the general public in Malaysia. Meanwhile, information obtained from the second section of the survey questionnaire is used to establish travelling nature or habits of respondents, which will be useful to derive any travel trends and needs. The questions in this section revolve around the respondents' frequency of travel, purpose of travel, travel preferences, etc. Meanwhile, the third section of the survey is designed to obtain direct feedback on standing cabin concept. In this section, the respondents are asked on their perception of current air transport services and introduction of proposed

standing cabin concept, plus their preference or expectation



(a)



(b)

Fig. 2. Public survey conducted in: (a) Sultan Abdul Aziz Shah Airport, (b) KLIA2

on the vertical seat design for standing cabin if they are to fly in it. Lastly, the final section of the survey questionnaire is to reaffirm the respondents' acceptance or non-acceptance stand towards the implementation of standing cabin concept in the commercial transport aircraft for domestic flights.

IV. SURVEY DATA ANALYSIS

In the survey, respondents are asked to answer questions regarding some issues or concerns with regards to the possible implementation of new standing cabin concept for domestic flight operations in Malaysia. They are also asked to give their opinions and also suggestions for the design of the standing cabin. The collected survey responses are analyzed to provide some insights on market potential and design expectations of this standing cabin concept.

A. Respondents' Demographic

The summary of participating respondents' demographic is presented in Table 1. It is observed that most of the survey respondents fall into age category between 20 to 45 years old, which is aligned with the age of passengers targeted for the implementation of the standing cabin concept.

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Unlike the current seated cabin, standing cabin concept does impose physical requirements on the passengers during flight. In addition, this is also greatly matched with the expected passengers' age group of frequent air travelers. All in all, the demographic of these survey respondents can be perceived as highly suitable to derive a good indication on the market acceptance and the design requirements for standing cabin implementation. It should be noted that few respondents have decided not to share their occupation and income, and these are categorized under "not specified" in Table 1.

B. Travelling Behaviors

The data collected from this section is used to establish the category of travelers for survey respondents. In a published study, the travelers with four or more trips per year could be considered as heavy travelers [23]. Following this notion for this study, a frequent or heavy air traveler is classified as those with at least five domestic air trips per year. As can be seen from the summary of data from this section as presented in Table 2, most of the survey respondents are indeed frequent travelers, which is a very good condition to derive an effective conclusion for this study. Moreover, most survey respondents fit into the targeted criteria of air travelers that are taken to be most suitable for the standing cabin implementation. Among others, the targeted air traveler's criteria for standing cabin are those who prefer or mostly travel alone and only carry hand luggage.

Table 1: Demographic information about the respondents

Description	Category	% Respondents
Gender	Male	60
	Female	40
Age	Below 20	5
	20 to 30	44
	31 to 45	29
	46 to 50	5
	51 and above	17
Nationality	Malaysian	90
	Non-Malaysian	10
Status	Single	46
	Married	54
Education Level	Primary	1
	Secondary	18
	Tertiary	81
Occupation	Professional	56
	Non-Professional	20
	Unemployed	22
	Not Specified	2
Monthly Income	Below RM 2500	14
	RM 2500 to RM 5000	17
	RM 5000 and above	24
	Not Specified	45

Table 2: Categorization of survey respondents based on their travelling background

Description	Category	% Respondents
Frequency of travel	< 5 per year	33
	≥ 5 per year	67
Travelling preference	Alone	66
	In group	34
Purpose of travel	Business	32
	Vacation	29
	Personal trip	23
	Other	16
Luggage preference	Hand luggage	68
	Cargo baggage	24
	Both	8

C. Response to Standing Cabin Concept

Survey participants are directly asked on their perceptions and opinions on the proposed standing cabin concept in third section of the questionnaire. When responding to a question on whether they would prefer to take flights with the standing cabin or other ground transport means for their trip, up to 89% of them have chosen the former option if the cost of the flight ticket is similar or just slightly more expensive than charging fare of the ground transportation options. However, when queried on the implementation of standing cabin against the current seated cabin onboard the aircraft, the responses are essentially divided. Up to 47% of the respondents are positive towards alternative standing cabin option but the remaining respondents have been either unresponsive or undecided for this new cabin concept implementation. Nonetheless, this can still be taken as good indication that there do exist potential market segments of air transport passengers that are receptive towards the idea for the standing cabin implementation. From data summary in Table 3, majority of the respondents have no health issue that will prevent them from standing and 74% of them actually have no problem to stand for up to two hours, which is the proposed flight duration for standing cabin use. Hence, this seems to imply that their reason for not supporting the idea of standing cabin concept is most likely due to their preference rather than the infeasibility of the cabin concept. This realization is important because, if standing passenger cabin implementation is done the right way, more passengers might be swayed into supporting it. As also shown in Table 3, there are several influential selection criteria that the mass public tends to consider when choosing their travel options. Top three factors established from the surveyed responses are travelling time, cost and comfort, all of which must be heavily considered in the implementation of the proposed standing cabin to attract the majority of travelers. In addition, survey participants who have given a positive response to future possible implementation of standing cabin concept are asked to rank their preference on the design. The ranking is done using a Likert scale of 1 to 10, where a score of 1 means that the criterion is of least importance whereas a score of 10 indicates an utmost importance.



Fig. 3 presents the result and it is observed that safety and comfort are ranked as the two highest factors among the other design factors, with a score of 9.4 and 7.0, respectively. This result has been rather expected since it is aligned with the general public reactions towards the idea of standing cabin concept when it is initially introduced in the media, which mostly draw a huge concern on safety aspects during flight and perceived discomfort on having to stand instead of sitting throughout the flight.

D. Comments and Recommendations on Standing Cabin Implementation

In this final section of the survey questionnaire, all survey respondents who has positively supported the standing cabin concept are asked to rate using a Likert scale on its potential implementation (1 for highly unlikely and 5 for highly likely). Close to 94% of the respondents have given a rating of 3 or higher when asked whether they would be willing to take the flights with a standing cabin concept instead of taking other current public transportation means. Moreover, when asked on how likely that they would promote the idea of taking the flights with standing cabin to other people, 91% of them have rated 3 or higher. This is clearly a very encouraging situation for future implementation of the standing cabin.

Meanwhile, for respondents who are rather unsupportive or undecided on this standing cabin idea, they are also asked for their primary reasons. Many of them have reasoned that it is because they are already happy and contented with the current seated cabin design. This has solidified the notion that their unwillingness to support the introduction of this new standing cabin idea is mostly driven by their travel preference and their perceived travelling discomfort in this cabin concept. When asked on what could be done to make them more receptive to this new standing cabin idea, their answers include offering significantly much lower flight ticket fares compared to the charge for the current seated cabin, provision of adequately comfortable and ergonomic support for the passengers while standing, and proven compliance to the safety requirements according to the standard regulations.

Table 3: Responses regarding standing cabin concept

Description	Category	% Respondents
What is your main consideration when choosing the public transportation?	Cost	13
	Time	58
	Comfort	23
	Privacy	4
	Others	2
Any health issues that prevent you from standing?	Yes	6
	No	94
Are you capable to stand for one to two hours?	Yes	74
	No	26

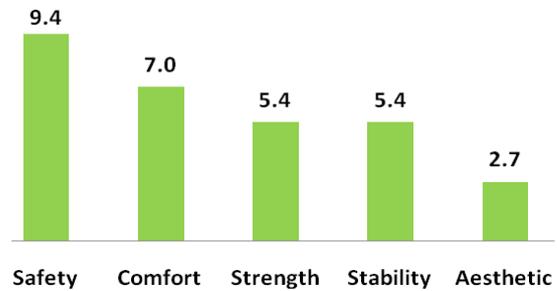


Fig. 3. Rating of design characteristics for standing cabin concept

V. FURTHER DATA ANALYSIS ON MARKET POTENTIAL FOR STANDING CABIN

The collected data from the public survey has been further analyzed to establish some relationships that could be useful to better understand the nature of the market demands and also requirements for future standing cabin implementation. Of particular interest is to define potential passengers' market segment that can be targeted for this standing cabin concept implementation. From the presented analysis results in Table 4, it appears that gender, age and financial status (measured through income) have significant influence on the acceptance of the standing cabin idea. This is very much in line with the researchers' expectation by observation while conducting the survey in public. The data analysis, which is conducted using the statistical SPSS software, measures correlation between the demographic parameters and the reception towards the proposed cabin concept using the Pearson's coefficient.

Table 4: Correlation of gender, age and income with reception towards standing cabin concept

Parameter	Pearson's coefficient
Gender	.093**
Age	.091**
Income	.077*

**Correlation is significant at the 0.01 level (2-tailed)

*Correlation is significant at the 0.05 level (2-tailed)

There is an indication of significant positive relationship between gender and positive support towards the introduction of the standing cabin, $r(998) = 0.093$, $p < 0.01$ that is skewed towards male respondents. Female respondents appeared to be less accepting of the standing cabin concept even though they are not strongly opposing the idea, often offering the "no opinion" answer to the survey questions. Moreover, most of the female respondents have also been more concerned about accommodating the needs of children and disabled people within this cabin concept. In the meantime, the supporters for this new aircraft passengers' cabin concept are rather skewed towards younger respondents, who have been also observed to be more positively receptive and interested on this new cabin idea during the conduct of the survey. This has been reflected by the resultant Pearson's coefficient that measures the correlation between age and support for the cabin concept, $r(998) = 0.091$, $p < 0.01$ that is more skewed towards younger survey participants' age that is ranging between 20 to 30 years old.



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Lastly, it is also found that there is a significant relationship between income level of the respondents and the support towards the standing cabin idea, with $r(998) = 0.077$, $p < 0.05$ that is skewed towards the middle income level ranging between RM 2500 to RM 5000. This is anticipated since it is observed that most respondents with a high income bracket are more inclined to prefer the current seated cabin due to travel comfort and they have less issue with the travel costs. Meanwhile, it is also observed that education level of the survey respondents appears to play a role, albeit not highly significant, where respondents with a higher education level are more aware and supportive of the revolutionary ideas and changes in general. Fig. 4 and Fig. 5 show the plots of the marginal means for gender, age and income of the survey participants based on their response to the question on whether they support the introduction of standing cabin concept or not. Here, a "yes" is given a rating of 1, "no" is rated as 2 and "undecided" is rated as 3.

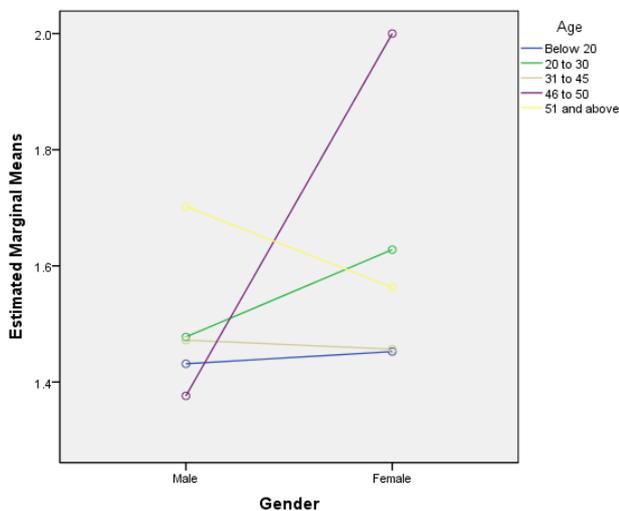


Fig. 4. Marginal means of rating with gender and age

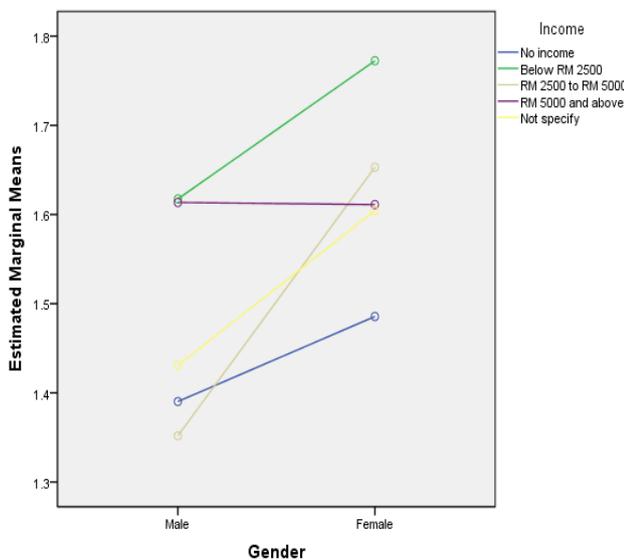


Fig. 5. Marginal means of rating with gender and income

Furthermore, it can be observed that male respondents who participated in the survey and are between ages of 46 to 50 are highly supportive of the idea. This is taken as good indication that the market for the standing cabin also exists for male travelers of older ages than the one established

before. On contrary, for female respondents, the highest group to support this standing cabin idea is those who are below 20 years old. Once again, this is outside the established target group before and can be taken as a sign that the market can be expanded to younger female travelers as well. Meanwhile, as for income group, the highest support from the male respondents comes from those within income category of RM 2500 to RM 5000 per month, which is in line with the previously established target group. On the other hand, the highest support from the female participants is observed to come from those without stable or no income, mostly housewives and students. A much lower flight ticket price for the standing cabin may be able to attract female travelers within this category. It should be noted from the observation by the researchers while conducting the survey, most respondents' behavior is mostly governed by both motivation to reply and the cognitive capacity to form an opinion. It is therefore believed that the socio-demographic background greatly affects the obtained answers due to the influences of respondents' life experience through their age and occupation. Moreover, in many cases, there appears to be some biasness when answering the survey questionnaire as many respondents tend to pay more attention to what they have heard recently through the media outlets instead of explanation given by the researchers. Accordingly, their provided answers to the questions are influenced by risk considerations and might not be entirely impartial view from the respondents themselves.

VI. CONCLUSION

A public survey has been conducted to establish the market acceptance level for the proposed standing passenger cabin concept in commercial transport aircraft for domestic flights in Malaysia. From the analysis of the collected survey data, it is concluded that the tendency to support this standing cabin design concept is correlated with several socio-demographic variables like age, gender and income level. In general, based on the analysis, the proposed target passengers' group for this standing cabin concept is male travelers of 20 to 30 years old with an income bracket between RM 2500 to RM 5000 per month. Nevertheless, further analysis also shows that there are other noteworthy potential target passengers outside of this established group. All in all, it is concluded that there exists a notable market demand for this innovative cabin concept and the Malaysian public in general is adequately supportive on its implementation for domestic flights in Malaysia. However, several issues or concerns with regards to the idea have been derived from the survey feedbacks that can be worked on to improve the market reception of the standing cabin concept, especially in terms of ticket price, comfort and safety aspects.

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