The Influence of Airport Terminal Wayfinding Model on Travellers' Behaviour at Kuala Lumpur International Airport (KLIA) Terminal, Malaysia

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***Abstract*— The purpose of this research is to assess the traveller's wayfinding behaviour of airport terminal access design. Airport wayfinding is defined as a process in which a traveller makes a decision to navigate using information support systems in order to arrive to destination successfully. Quantitative data is acquired to give meaningful results justifying the research outcomes and allow non-biased interpretation of the research results. It represents the process within the development of the methodology and the concept of airport terminal access design and human wayfinding behaviour. The questionnaire is used to increase the reliability and validity of the research. Respondents who volunteered for the study are chosen among the travellers in airport terminal. The Mean, Standard Deviation (SD) and Two-Way ANOVA test were used to analyse the results and discussed with reference to the general needs as standard design of airport terminal access and take into account the preference of travellers' general experience. The paper will conclude by suggesting guidelines for airport terminal wayfinding design that will seek to optimise the relative aspirations of all parties concerned. Although many studies have been conducted on wayfinding in general, a detailed evaluation on airport terminal wayfinding design and human wayfinding behaviour in respect of travellers were still unexplored domains.**

***Keywords*—** *Air transport, wayfinding,behaviour and design.*

1. Introduction

Wayfinding is useful for making a quick decision due to complex terminal access design. Travellers use two immediate elements of wayfinding; choices and clues. Choices are related to instance decision points in wayfinding [1]. The choices give opportunity to decide two or more alternative ways of airport terminal access. Travellers prefer to use a clue to make estimation based on terminal architecture. Clues include any signs and physical architecture inside the airport terminal. Ref. [2] explains that the wayfinding inside a terminal should not be expected to overcome architectural wayfinding barriers. Thus, it is important that airport terminal wayfinding is designed based on a traveller's wayfinding perspective and seize opportunities to correct architectural problems whenever possible. In addition, choices or decisions are important elements when travellers have to decide among two or more different ways. Difficulties in making a quick choice increase workload for travellers, such as time wasting, motivation decrease, no short turns and incidents.

Ref. [3] stated a large-scale space in an environment (i.e. such as airport terminal) usually takes place in human wayfinding. It is due to unmoved objects or physical wayfinding (e.g. landscapes and buildings) around airport space, as travellers have to navigate to learn about it. Human wayfinding is based on 'a consistent use and organization of definite sensory cues from the external environment' [4], [5]. Previous research related to human wayfinding mostly dealt with the exploration of 'knowledge of the head' [2] cited in and less attention has been paid to the 'knowledge in the world' [1]. This is because people do not need to have all knowledge in order to behave accurately [1] during navigation inside the airport terminal.

Furthermore, poor wayfinding provision discourages travellers [6-8] in airport areas. For instance, people fail to navigate in the first time because they are unable to understand the complete topological structure of the space [7]. They cannot perceive the space from a single viewpoint in large-scale spaces [8],[9] and have to navigate through extensive areas to locate specific 'things' in space

[10]. The space as urban elements is useful in dividing the environment into smaller and clearly connected parts [4] from the departure point to the destination in order to navigate in the airport terminal. Taking landmarks as one of the recognised indicators visible to any traveller implies the importance of signage [11].

The design of signage and wayfinding, and the facilities provided for airport building is very important to all travellers, as airports contribute to high growth economies and affect the environment and quality of life. Meanwhile, the government aims to ensure all transportation networks, including airport signage, are protected by effective systems and adequate policies for safety. The debate concerning visual effects caused by the proliferation of signs and wayfinding in airport terminal has led to considerable discussion by airport planners. This is a major problem which threatens to become greater as more and more elements are added to airport terminals; much of the wayfinding furniture is not there to help with airport terminal safety and it is understandable and right that airport authorities consider this one of their main priorities [8]. Ineffective signage [10] in the airport terminal distracts from wayfinding. Harding [12] stated that many airports have not established the concept of 'simple, functional and less is more' for airport signage systems. He suggests a simple wayfinding and sign message could help reduce the overall cost of poor signage systems which make them less attractive and competitive than alternative airport terminals [13], [2]. This distraction (e.g. too much advertising signage) can increase travellers' confusion and raise the risk of incidents [14], [15] in airport terminals.

2. Methodology

In order to evaluate the airport terminal wayfinding, an adoption of a specific method of research to achieve the study objectives was reviewed. In this research, the descriptive approach continued to be applied to understand airport road access wayfinding. A problem or situation was evaluated using a descriptive analysis after extensive previous knowledge was defined [16]. This research needed extensive preliminary work to be done to gain familiarity with the phenomenon in the airport terminals' wayfinding situation and understanding the research scope for further investigation. For instance, emails have been sent to academic and professional experts in order to have a better understanding of airport terminal and wayfinding systems. Theories (e.g. theoretical frameworks), hypotheses and theoretical model were designed after airport terminal wayfinding data and patterns were gathered. In order to increase the validity of the research on airport terminal wayfinding design, the quantitative approach was applied. Items and concepts were tested through a questionnaire. Ref.[17] stated that the questionnaire can be carried out by employing the same research instrument in another context with the problem of causality being eased by the emergence of path analysis to which surveys are well suited.

The questionnaires were designed to be effective, approachable and easy to understand. Feedback and comments were acquired from airport travellers. The first section indicates respondent demographic profiles. General information is useful in obtaining data on the background of the respondents which might have a direct correlation with the responses to the questionnaire statement [18]. Section 2 evaluates the impact of airport terminal wayfinding on low-cost airport terminal travellers. The questions were developed based on research questions; *what are the key factors that may influence safe wayfinding behaviour in airport terminal?, what are the impacts of airport wayfinding design on travellers' behaviour?, how should the impacts of airport wayfinding design on travellers' behaviour be measured?, does airport access design have an effect on wayfinding?, how should the effects of airport terminal design on wayfinding be measured?, and how does the receipt of wayfinding information affect traveller navigation?*

3. Result and discussion

There was a total of 200 respondents who volunteered to participate in this research as a convenience sampling design was applied. In total, 117 male respondents (58.5 per cent) and 83 female respondents (41.5 per cent) successfully completed the questionnaire session. By age group, the respondents volunteered in this research are from 20 years old until 60 years old and above; 20-29 years (28 respondents), 30-39 years (69 respondents), 40-49 years (49 respondents), 50-59 years (26 respondents), and Over 60 years (8 respondents). Based on frequency analysis, the respondents' purpose of travelling to the airport are mainly for leisure rather than business purposes. From the survey 75% of respondents travelling for leisure purpose, followed by 24% of respondents who travelling for both business and leisure purpose, and 1% of respondents travelling for only business purposes. Table 1 shows the respondent feedback based on the questionnaire.

Table 1. Driver Mistakes on Simulated Driving

Parameter	F	Sig.
It was easy to navigate in the airport terminal	1.866	0.118
I noticed that the terminal building structure were blocking some of the signs	1.902	0.112
There were too many terminal lights	5.703	0.000
Poor visibility inside airport terminal because of terminal design	3.011	0.019
At the decision point in the airport terminal, I was able to make a fast decision	3.399	0.010
The lighting in the terminal did not affect my feeling of safety	3.643	0.007
The level of urgency did not make any difference to my navigation	0.365	0.834
I felt nauseous when perform a wayfinding	3.071	0.018
I felt safe to perform the navigation in the airport terminal	6.024	0.000
The airport signs were easily noticeable	0.531	0.713
I could not read the text on the signs	1.099	0.359
I was looking for the word of “departure” on the sign	8.636	0.000
Type of warning signs were adequate	0.996	0.411
The font of the airport signs was clear and readable	1.535	0.193
The signage helped me navigate easily	2.071	0.086
There were too many adverts in the airport terminal	2.381	0.053
I could not read the adverts	1.678	0.157
I was distracted by the adverts	2.561	0.040
The frequency of warning signs was adequate	5.453	0.000
The variable directional signs were noticeable	8.043	0.000

All respondents agreed that the airport terminal wayfinding process was safe and convenient to complete (F=6.024, p=0.00). The results also show that respondents felt nauseous when performing wayfinding in airport terminal (F=3.071, p=0.018). In term of airport terminal design, respondents found that there were too many lights in the terminal (F=5.703, p=0.000) and poor visibility inside the terminal (F=3.011, p=0.019). However, all respondents were not affecting by the terminal lighting during wayfinding process (F=3.643, p=0.077) and able to make a fast decision at the decision point (F=3.399, p=0.010) in the airport terminal. Although, the airport terminal design indicates a simple and convenient wayfinding, respondents were distracted by the adverts (F=2.561, p=0.040) that has been displayed in the airport terminal. It allowed the researcher to assess respondents’ visibility and decision making (i.e. based on questionnaire). Respondents believed that adverts (F=2.381, p=0.053) reduced their navigation and visibility towards the upcoming wayfinding process.

Too many adverts signs led to traveller becoming confused, missing the way and stress in the airport spaces [8]. However, the advert sign is important to generate extra airport income. Therefore, airport planners should find the balance between the safety and commercial provision in order to develop an ideal airport terminal

wayfinding design [20]. The frequency of warning signs (F=5.453, p=0.000) was acceptable and the variable direction signs (F=8.043, p=0.000) were noticeable in the airport terminal. Surprisingly, all respondents agreed that the urgency (e.g. late check-in and unfamiliar terminal area) did not make any difference during wayfinding process (F=0.365, p=0.834). Respondents were also looking for the word 'departure' on the signs (F=8.636, p=0.000) before check-in to continue their travelling.

4. Conclusion

The results confirmed that as suggested by ref. [2], [20], the signage in the airport terminal should not be ambiguous (e.g. fonts and colours) as they were designed to assist airport travellers in complying with airport regulations whilst in the terminal. However, the ambiguity of signs led to misunderstandings or to the simple omission of the signs' information. Travellers are not able to process too much information at one time and are not able to make fast manoeuvres to change their walking speed when required [21]. Travellers can only determine acceptable information loads that they can manage while navigating. When travellers' acceptable incoming information load is exceeded, they may neglect the information based on level of importance (i.e traveller who was looking for the word 'departure' on the sign, they may neglect the warning signs) [2], [22]. Based on the travellers' feedback, as making a journey with a proper plan improves airport wayfinding process. These results confirmed the importance of sign information; they need to be accurate, designed and placed to assists travellers to locate, easily read and understood, if there is possibility that travellers need to change their plans and behaviour [2], [22].

References

[1] Raubal, Martin, and Max J. Egenhofer. *"Comparing the complexity of wayfinding tasks in built environments."* Environment and Planning B: Planning and Design, Vol. 25, No .6, pp. 895-913, 1998.

[2] Harding, J. R., et al. *"Wayfinding and signing guidelines for airport terminals and landside, ACRP (Airport Cooperative Research Program), Report 52."* Transportation Research Board of the National Academies, Washington, DC, (2011).

[3] Kuipers, Benjamin. *"Modeling spatial knowledge."* Cognitive science, Vol 2, No .2 pp. 129-153, 1978.

[4] Lynch, Kevin. *"The image of the city"*. Vol. 11. MIT press, 1960.

[5] Raubal, Martin, and Michael Worboys. *"A formal model of the process of wayfinding in built environments."* International Conference on Spatial Information Theory. Springer, Berlin, Heidelberg, 1999.

[6] Burns, Peter C. *"Wayfinding errors while driving."* Journal of Environmental Psychology, Vol. 18, No. 2, pp. 209-217, 1998.

[7] Darken, Rudolph P., and John L. Sibert. *"Wayfinding strategies and behaviors in large virtual worlds." CHI*. Vol. 96, 1996.

[8] Kanakri, Shireen, et al. *"Wayfinding systems in educational environments."* Environment and Ecology Research, Vol. 4, No. 5, pp. 251-256, 2016.

[9] Raubal, Martin, and Stephan Winter. *"Enriching wayfinding instructions with local landmarks."* International Conference On Geographic Information Science. Springer, Berlin, Heidelberg, 2002.

[10] Leversen, Jonas SR, Brian Hopkins, and Hermundur Sigmundsson. *"Ageing and driving: Examining the effects of visual processing demands."* Transportation research part F: traffic psychology and behavior, Vol 17, pp. 1-4, 2013.

[11] Baskaya, Aysu, Christopher Wilson, and Yusuf Ziya Özcan. "*Wayfinding in an unfamiliar environment: Different spatial settings of two polyclinics.*" Environment and Behavior, Vol. 36, No. 6 pp. 839-867, 2004.

[12] Harding, Jim. *"How to tell if your airport has a wayfinding problem."* Journal of Airport Management, Vol 6, No.3, pp. 231-242, 2012.

[13] Alhussein, Saad N. *"Analysis of ground access modes choice King Khaled international airport, Riyadh, Saudi Arabia."* Journal of Transport Geography, Vol. 19, No. 6, pp. 1361-1367, 2011.

[14] Cuenen, Ariane, et al. *"Does attention capacity moderate the effect of driver distraction in older drivers?."* Accident Analysis & Prevention, Vol 77, pp. 12-20, 2015.

[15] Fofanova, Julia, and Mark Vollrath. *"Distraction while driving: The case of older drivers."* Transportation research part F: traffic psychology and behavior, Vol 14, No. 6, pp. 638-648, 2011.

[16] Robson, Colin, and Kieran McCartan. *"Real world research"*. John Wiley & Sons, 2016.

[17] Bryman, Alan. "Integrating quantitative and qualitative research: how is it done?." *Qualitative research*, Vol. 6 No. 1, pp. 97-113, 2006.

[18] Sekaran, U. "Research methods for business: A skill building approach . United States of America: John Wileyand Sons." 2003.

[19] Eye Airports (2014) High FedEx ad recall by target business travellers. Available at: http://eyeairports.com/information/airport-advertising-case-studies (Accessed: 21 April 2016).

[20] Suzer, Ozge Kumoglu, Nilgun Olgunturk, and Dilek Guvenc. *"The effects of correlated colour temperature on wayfinding: A study in a virtual airport environment."* Displays, Vol 51, pp. 9-19, 2018.

[21] Orellana, Nicolas, and K. Al-Sayed. *"On spatial wayfinding: agent and human navigation patterns in virtual and real worlds."* 2013.

[22] Symonds, Paul. *"Wayfinding signage considerations in international airports."* 2017.