

# Preferences of Low-Cost Passengers, Low Cost Airlines and Airport Management on Low Cost Terminal (LCT) Facilities Development Model

Rohafiz Sabar<sup>1</sup>, Nur Khairiel Anuar<sup>2</sup>, Rohani Abdullah<sup>3</sup>

*Department of Logistics and Transport, School of Technology and Logistics Management (STML),  
UUM College of Business, Universiti Utara Malaysia, 06010 Sintok, Kedah, Malaysia*

<sup>1</sup>rohafiz@uum.edu.my

<sup>2</sup>nurkhairiel@uum.edu.my

<sup>3</sup>rhani@uum.edu.my

**Abstract**— The purpose of the Paper is to examine the provision of passenger facilities in Low Cost Terminals (LCTs) after reviewing a selection of LCT models at airports in the Asia Pacific, European and United States regions, and supported by an in-depth survey of low cost passenger, low cost airline and airport management preferences related to operations at the Low Cost Terminal, Kuala Lumpur International Airport. The forecasting of passenger profiles is important so that the airport can establish an adequate terminal design which may be able to cope with an acceptable level of service to the passengers while, at the same time, the terminal is able to generate sufficient commercial revenues from the LCC customers. Taking account of the LCC profiles, the airport needs to pay attention by ensuring their preferences for facilities and level of service should be included in the terminal design. The decision by airport management for the provision of specific terminal facilities (TFs) may be dependent on budget restrictions, cost of investment, land availability and the preferences of the major customers, that is, in the case of LCTs, the low-cost carriers (LCCs). Consequently, most (but not all) LCT designs are based on the concept of a basic terminal layout with limited terminal facilities in order to reduce both construction and operating costs, a shorter construction time, acceptable service standards and minimum aircraft turnaround time. However, there are contradictions. For example, passenger expectations of level of service and terminal facilities do not always coincide with those of airline and airport management. Furthermore, a consequent low level of aeronautical revenue drives the requirement to maximise commercial revenues. The paper will conclude by suggesting guidelines for LCT development that will seek to optimise the relative aspirations of all parties concerned.

**Keywords**— *Low Cost Terminal, Airport Planning and Management, Basic Terminal Facilities, Green Airport*

## 1. Introduction

Provision of low cost terminals (LCTs) facilities have attracted the interests of airports, airlines and passengers and much effort has been directed towards understanding the concept and its practicality. A significant number of LCTs have been constructed as a result of the growth of Low Cost Carriers around the world. The growth of LCTs, as a result of the establishment of LCCs, has led to the concept of fewer facilities being offered to airport users in return for a reduction in aeronautical charges. The industry has seen the introduction of various types of LCT such as Warsaw, Kuala Lumpur International Airport (KLIA), and Coventry, the production of various guidelines for the development of LCT facilities, and promoting the concept of ‘simple and functional’ into terminal design. Many airports have established the concept of simplification into their LCT design in order to reduce the costs associated with terminal development and operation. Other airports have responded to fulfilling airlines’ needs and passengers’ preferences in order to attract significant numbers of LCCs and their passengers to use the airport and associated terminal facilities.

LCTs have their own capability to process flights and passengers using a simplified terminal building design. The planning of LCT facilities includes both airside and landside facilities which are able to cater for up to 10 million passengers traffic per annum (MPPA). In terms of terminal design, LCTs are classified into two different kinds, converted and dedicated (new-build). A converted terminal is a rebuilt structure or a modification of an existing

building into an airport terminal building which includes the processing activities for the airline and passengers. There is usually no provision for transfer passengers. Most simplified designs of LCT in European Countries have followed the converted terminal design concept in order to reduce capital investment cost. The construction of a specific area of terminal building for processing activities (i.e. check-in, baggage reclaim) can be classified as the converted area (e.g. Frankfurt Hahn Airport). The development of a converted terminal should be considered after taking into account restricted land availability and the high capital investment to construct a separate terminal building. The converted terminal size is small compared with dedicated terminals.

The planning for a dedicated terminal is aimed at a simplified design concept either as a new building or extension of an existing terminal building. The planning of an LCT is similar to the small airport terminals when considering passenger traffic volumes, aircraft mix, capital investment, availability of resources and future expansion. A dedicated LCT may also include a multiple range of commercial initiatives (e.g. kiosks and self-vending machines) to be included in the terminal design. Recent examples of new dedicated terminals can be found in KLIA LCT and Kota Kinabalu, Malaysia, and the Budget Terminal, Changi International Airport, Singapore. Table 1 indicates the characteristics of LCT design to be compared with 'traditional' terminals and small airport terminals.

**Table 1.** Summary of LCT characteristics [1]

Characteristic	Description
Overall	Simple design, low charges imposed on airlines as Passenger Service Charges (PSC) indirectly imposed through ticket price to passengers.
Passenger type	Short-haul leisure (including VFR and holiday makers) and business.
Type of terminal	Converted and dedicated buildings.
Types of facilities	Aim for high efficiency, basic terminal facilities, maximise aircraft turnaround to 25 minutes
Type of aircraft	Typical for LCCs (i.e. A320, B737).

Airlines	Charter, regional short haul, origin-destination, no transfer.
Apron	'Remote stand' – passengers will take bus or walk between departure gate and aircraft or vice versa, avoidance of air bridges.
Commercial revenue	Limited retail and catering.
Terminal facilities	Usually, single storey airport terminals, reduced costs (reduced capital investment and depreciation charges for airport), quick check-in (i.e. e-tickets, no transfers, minimum hold baggage), no executive or business lounges (reduced costs for airports or airlines). Usually (but not always) only road access, coach services to service nearest cities or towns.
Airside facilities	Short taxiing distances to and from terminal building, minimum runway length sometimes specified (2200 metres for B737 operation).
Terminal building	Low (conversion) to medium lifetime.
Passenger processing time	Short and highly efficient, depends on support facilities.

## 2. Basic Concept of Low-Cost Terminal (LCTs)

The differences in service standards offered by 'normal' and LCCs have a significant impact on terminal facilities' ability to meet airline preferences [2]. LCCs require simple and functional facilities to serve their passengers while offering discounted prices or a reduction in the amount to pay for travel, as well as promoting their point-to-point services [3]. Thus, recent examples of LCT design try to establish a basic terminal facilities concept, focused on cost saving and making use of economic resources. The design also emphasises cost effectiveness, simplifying the terminal process and providing easy access to the terminal building. Cost-effectiveness and efficient terminal design are important, especially for the development of new facilities at terminals [4].

The provision of LCT terminal facilities should always be designed to suit the requirements of airlines and passengers. The increased demand of passengers creates a significant pressure on airport authorities to develop new facilities to accommodate the airline and passengers with a reasonable level of service [5]. The requirements of terminal design should include the market segment interest (i.e. leisure, low cost, business). Growth in demand, if not met by provision of these, will result in delayed trips, deteriorating quality of service and unacceptable levels of overcrowding in the terminal building [6].

The provision of terminal facilities (i.e. departure and arrival areas) is required to meet standard levels (i.e. check-in processes within 90 minutes) that been set in order to reduce costs of turnaround time. Therefore, airport planners should decide on the level of adequacy of the facilities to be included in terminal design. A balanced provision of terminal facilities can improve service levels during the turnaround time as well as achieving the aims of the LCCs.

LCCs have also benefited from advances in simplification of terminal facilities, as indeed have other airlines. Changes in check-in processes and furniture are just one of a number of issues that airport management have had to deal with in terms of current airport terminal design and operations. On one hand, the LCCs are pushing for minimal airport charges and efficient terminal operations. On the hand, both business and leisure passengers have specific expectations, not only in terms of low fares, but also in the quality of service and facilities available at an airport. At a number of airports, the response has been to reduce capital investment by building dedicated Low Cost Terminals (LCTs) or to convert existing buildings. Where the problem lies, is what is the trade-off between airlines, passenger and airport management expectations, and is there a conflict between the expectations of these parties? This Paper seeks to examine the preferences of business and leisure passenger, airline and airport managements perceptions of facilities that should be available in an airport terminal but the availability of which could be traded-off against a reduction in air-fare and cost and revenue structures that is, from a passengers, airline and airport point of views, what relationship is there between the provision of specific facilities, and quality of service, if a further reduction in fare and cost and revenue structures were possible.

### **3. Research Methodology**

The target audience was Air Asia business and leisure passengers, airport and airline managers and executives using the newly opened LCT at Kuala Lumpur International Airport (KLIA).

#### **3.1 Air Asia business and leisure passengers**

A survey of passengers was undertaken to collect information on their perception of, and views on, the provision of specific facilities included in the design of the new LCT. The researchers were assisted by survey teams from the Malaysian Airport Management Technical Service (MAMTS) and who were used to collect the data, often by face-to-face interviews with passengers, using a pre-designed questionnaire. Five hundred questionnaires during the course of the survey were handed out and a total of 360 questionnaires were returned, with a 72% response rate. The questionnaires were distributed to the passengers while they were waiting to board flights in the departure lounge and waiting to collect baggage in the arrival hall.

In the survey, each passenger was asked to express their views on the experience of using the facilities in the LCT. The questionnaire was divided into two sections: departures and arrivals. In the departures section (check-in and departure lounge, including commercial and boarding areas), the passengers were asked about their preferences for the provision of specific facilities. Likewise, the arrivals section of the questionnaire was used to evaluate the provision of facilities in the baggage reclaim and arrival hall areas. The inclusion of commercial facilities in the questionnaire was to measure passengers' preferences to have those facilities included in LCT design. However, no evaluation was made of security and immigration facilities as these have to meet government rules and regulations, and therefore the provision of these facilities is outside the control of terminal planners.

#### **3.2 Airline management**

The second survey was aimed at evaluating the relationship between airport charges and TF s provision into LCT design as seen from the airline management point of view. The survey was

undertaken within the LCT at KLIA, Malaysia. It is, therefore, the study that will investigate whether the current availability of TFs will satisfy the needs of airlines in terms of selection of core and secondary facilities in LCT design as a function of the airport charges structure. As stated in the previous paragraph, purpose sampling was adopted for the survey, focussing on the judgemental process of elements in their experiences of TFs, within the LCT. A choice of subjects was taken into consideration, for example, decisions by individuals being in the best position to provide information on TFs provision.

The survey had aimed to give a general idea of the consideration given to TFs and cost and revenue structures. It was used to measure the relationship between TF provisions and airport charges structures in order to determine core and secondary TFs for LCT design. The self-designed questionnaire was developed and tested after completion of KLIA LCT.

### 3.3 Airport management

A survey was conducted for Malaysia Airport Holding Berhad (MAHB) management that aimed to evaluate the relationship between the provision of terminal facilities and costs (airport charges, capital investment, operational charges) and revenue (airport revenue) for LCT design. The survey was conducted at the management offices of KLIA. Sixteen respondents were involved in this study that used the questionnaire that aimed to explore airport management experiences and views towards the inclusion of specific LCT facilities.

The questionnaire was designed to be distributed to senior airport management and executives to gather their experiences on the provision of LCT facilities. The questionnaires evaluate the relationship between terminal facilities and cost and revenue structures, as well as demographic profiles. Therefore, it was designed and distributed to staff in managerial and executive positions at MAHB. The questionnaires were distributed, and sixteen participants from various positions in the MAHB gathered in order to discuss their interest in LCT development. Analysis of the returned questionnaires indicated airport management preferences on cost and revenue structures in general, as well as the selection of core and secondary TFs for LCT design.

The Paper investigates a hypothesis testing analysis using the Mann-Whitney-Wilcoxon (Mann-Whitney) test to determine the allocation of core and secondary TFs in LCT design. The Mann Whitney Test is used to measure statistical hypothesis by using a non-parametric test to determine the core and secondary TFs in LCT design. The Mann Whitney Test has been selected to measure the relationship of two samples from the same population having same distribution [7]. The Test is a nonparametric test for examining significant differences when the dependent variable is measured on an ordinal scale and the independent variable on a nominal scale [8].

## 4. Proposed LCT Facilities Conceptual Model, Including Cost and Revenue Structures and Terminal Facilities

The Paper focuses on the evaluation of specific terminal facilities after reviewing various LCT models and developments. The output of this Paper is a proposal for a conceptual model which indicates the core and secondary terminal facilities that should be included in a LCT design, after examining the preferences of airline and airport management and passengers. By examining the current provision of terminal facilities KLIA LCT, indicate the selection of core and secondary facilities for future dedicated LCT designs following the surveys. The LCT facilities' conceptual model should enable increased efficiency of airport operations. Thus, the aim of LCT development to minimise aircraft turnaround times may be achieved. For basic terminal facilities provision, the adoption of single level terminal buildings is the ideal concept of a LCT with faster check-in services, simple baggage-handling system, no passenger transfers and simple surface access for passengers.

Table 2 shows the results on the passengers' preferences for terminal facilities in LCT design by considering their core and secondary preferences in the check-in, departure lounge and arrival areas. In the check-in area, both business and leisure passengers rated air conditioning, airline ticketing counter, information counter, bureau de change, café or restaurant, FIDS, manual check-in counter, seating, self-service check-in machine, telephone and toilet as core facilities. Regarding their secondary preferences, these included baby

changing facilities, trolleys, cash machine, disabled facilities, prayer room, product promotional area, shop, smoking area, television and way-finding. The proposed conceptual model supported the view that air fares can be used to determine the adequacy of TFs provision within LCT design.

**Table 2.** Preferences for LCT facilities from the viewpoint of Air Asia passengers

	Air Fares	
	Core facilities	Secondary facilities
Check-in	Air conditioning, airline ticketing counter, information counter, bureau de change, café or restaurant, FIDS, manual check-in counter, seating, self-service check-in machine, telephone and toilets.	Baby changing facilities, trolleys, cash machine, disabled facilities, prayer room, product promotional area, shop, smoking area, television and way-finding.
Departure Lounge	Air conditioning, bureau de change, café or restaurant, cash machine, FIDS, information board, internet, seating, self-service vending machine, shop and toilets.	Baby changing facilities, children plays area, disabled facilities, prayer room, product promotional area, public telephone, smoking area, television, viewing deck and way-finding.
Baggage reclamation area and arrival halls	Air conditioning, information counter, baggage reclamation signage, car hire counter, FIDS, hotel reservation counter, left luggage service, seating, self-service vending machine, shop, taxi counter, television and toilets.	Baby changing facilities, trolleys, bureau de change, bus counter, café or restaurant, cash machine, disabled facilities, lost and found counter, prayer room and public telephone.

Table 2 also shows the preferences of business and leisure passengers for terminal facilities in the departure lounge. Air conditioning, bureau de change, café or restaurant, cash machine, FIDS, information board, internet, seating, self-service vending machine, shops and toilets are classified as core facilities that should be included. Noting the self-vending machine as an example, the availability of this facility can reduce LCT design

cost and space while, at the same time, it creates extra income for airport revenue. In terms of allocation of secondary facilities in LCT design, both business and leisure passengers indicate their preferences towards having baby changing facilities, children's play area, disabled facilities, prayer room, product promotional area, public telephone, smoking area, television, viewing deck and way-finding.

In the same Table, for the baggage reclamation area and arrival hall, air conditioning, information counter, baggage reclamation signage, care hire counter, FIDS, hotel reservation counter, left luggage service, seating, self-service vending machine, shop, taxi counter, television and toilet were selected as core facilities. Also worth noting is that the simplified concept such as the take-away aspect of self-vending machines should also be considered. Baby changing facilities, trolleys, bureau de change, bus counter, café or restaurant, cash machine, disabled facilities, lost and found counter, prayer room and public telephone were classified as secondary facilities.

The results from the survey indicate that the views of the managers and executives of Air Asia are similar. Taking Air Asia management preferences as an example (Table 3), a suitable number of manual check-in counters, ticketing counters and self-service check-in machine are classified as core facilities, and both managers and executives preferred that these facilities be included in future LCT designs. Air Asia management considered hand baggage check-in and airline offices as being secondary facilities. In the departure lounge area, except for seating availability, most of the TFs are rated as secondary facilities. Seating availability in the check-in area was seen as important as both executives and managers indicated that this facility should be included as part of LCT design as airline boarding delays create a potential demand for seating. Airline management also expressed a preference for operating a LCT with only basic facilities, without the provision of air bridges, to reduce the cost of airport charges (Graham, 2006).

Also shown in Table 3, a sufficient number of baggage reclaim carousels were considered as the most important facility to be included in the baggage reclaim area. A sufficient number of baggage reclaim carousels should be included in LCT design. However, the baggage reclaim display and lost and found counters were classified as

secondary facilities in the baggage reclaim and arrival hall areas. Disabled facilities and toilets were seen to be important as the availability of these facilities is limited in the current LCT design.

In the check-in area, airport charges influence the provision of terminal facilities. Installation of manual check-in desks and self-service check-in kiosks was significantly related to the flexibility of airport charges. The other facilities (i.e. airline offices and product promotional areas) were considered as secondary. Airport management (executives and managers) preferred contact stands and a sufficient number of automatic baggage handling carousels. These facilities significantly influence the level of airport charges. For example, excluding air-bridges, in preference to contact stands, will reduce LCT construction costs and therefore the level of airport charges.

In terms of capital investment, both managers and executives consider that self-service check-in kiosks and number of automatic baggage handling carousels have a direct impact on the amount of capital investment to be allocated. Equipment costs can be reduced through less dependency on both information technology (check-in and passenger information) and the use sophisticated baggage handling systems used for baggage transfer.

Operational charges would be expected to be reduced through limited terminal facilities provision. The use of advanced technologies such as self-service check-in may reduce operational costs. The minimisation of operational processes and labour costs with the LCT concept is expected to save 30 to 40% of the traditional terminal costs. The cost of labour-intensive activities, including security, is difficult to reduce. However, check-in and commercial facilities can be reduced through the introduction of self-service check-in and smaller airline lounges (payable) compared with the 'traditional' terminal.

Increases in commercial revenue are indirectly linked with the growth in passenger traffic. As passengers spend more in commercial outlets within the LCT, they contribute towards additional airport revenue. By inclusion of bureau de change, café or restaurant and cash machines as core facilities, such a commercial initiative at KLIA increased commercial revenues by about USD300 000 in 2006.

#### 4.1 Check-in area

1. Airline and airport management, and passengers, preferred to have a sufficient number of manual check-in desks and self-service check-in kiosks to be included in LCT design. These facilities were rated as highly important as only a limited number of these facilities is currently available at KLIA LCT.
2. The survey showed that bureau de change (BDC) and café or restaurant are highly important based on airport management and passengers preferences.
3. Both airline management and passengers agreed that airline ticketing counters should be available at KLIA LCT, although these facilities could be replaced in the future by online ticketing services.
4. Also, air conditioning, FIDS, information counter, seating, television and toilets are highly important according to the viewpoints of Air Asia business and leisure passengers.

#### 4.2 Departure Lounge

1. Bureau de change (BDC), cash machines and self-vending machines were preferred by airport management and passengers. Noting the self-vending machine as an example, the availability of this facility is important as the allocation of this facility could generate extra revenue for the airport. Apart from that, the passengers feel that it is more convenient to have this facility available.
2. Seating was strongly required by airlines and passengers as most of the passengers were experiencing limited seating at the current KLIA LCT.
3. Contact stands are important to reduce LCT capital investment cost.
4. Air conditioning, café or restaurant, FIDS, information board, internet, shops and toilets were also of high importance for passengers.

#### 4.3 Baggage reclamation and arrival hall

1. Both airlines and airport management preferred a sufficient number of baggage reclaim carousels in the baggage reclamation

hall. They rated the facility as being of high importance as there are a limited number of carousels in the current LCT design.

2. Toilets are considered as being a core facility by airline management and passengers as the simplified design of the current LCT has restricted space for toilets.
3. Air Asia preferred to have disabled facilities for their passengers.
4. The following facilities were rated as core facilities based on passenger preferences: air conditioning, baggage reclamation signage, car hire counter, FIDS, hotel reservation counter, information counter, left luggage service, seating, self-vending machine, shop, taxi counter and television.

**Table 3.** Preferences for LCT facilities from the viewpoint of Air Asia passengers

Facility	Airport charges	
	Core facilities	Secondary facilities
Check-in	Number of manual check-in counter, ticketing counter and self-service check-in machine	Hold baggage check-in and airline office
Departure Lounge	Seating	Airline boarding counter, airline shop, boarding pass control machine, air-bridge and standing area
Baggage reclamation area and arrival halls	Number of baggage reclaim carousels	Baggage reclaim display and lost and found counter
Other facilities	Disabled facilities and toilets	Air conditioning, FIDS, Information counter, way-finding, café or restaurant and product promotional area

## 5. CONCLUSION

The Paper has shown that there are conflicting expectations existing between passengers, and airline and airport management. A reduction in airport (passenger service) charges is seen as important in encouraging LCCs to develop routes and, in turn, passengers to make use of the LCT facilities. Therefore, a reduction in airport charges is seen as being in the interests of both passengers and LCCs, and therefore LCC management are supportive of the simplification of terminal facilities. However, it is necessary to ensure that sufficient terminal facilities should be provided to ensure the efficiency of terminal operations as far as passengers are concerned. For example, the development of the KLIA LCT has seen a comprehensive programme of consultation, in relation to the current and prospective needs of all airport users (in particular, the LCCs and passengers). The challenge for LCT development is to consider the varying objectives and requirements of the LCCs, the passengers and the extended airport community, and to balance short-term requirements with proper long term planning for the ongoing development of the LCT.

In conclusion, the proposed conceptual design benefits passengers and airline management as well as airport management by indicating specific concepts which take into account the influence of cost and revenue structures in LCT design. However, in order to enhance the research outcomes, future researchers, planners and designers should be able to integrate 'real cost data' into the LCT design concept. With inclusion of 'real cost data', the proposed concept could be more viable, relevant and unique as airport management can take advantage of cost estimates while planning a specific LCT design. However, the applicability of the proposed conceptual design can be enhanced while airport management is able to take into account PESTLE analysis, more specifically the influence of culture (i.e. lifestyle) of passengers. As LCT research is still a new domain, it is of potential interest to airport management for reducing airport costs while planning and development of the airport takes place. In-depth discussion on cost and revenue structures contributes to the minimising of construction costs. The proposed conceptual design model will therefore enhance airport capacity in future LCT development.

## References

- [1] SABAR, R. An Evaluation of Alternative Low Cost Terminal Model. PhD Thesis, 2009. Cranfield University, UK.
- [2] MCLAY, P. and REYNOLDS-FEIGHAN, A. (2006). Competition between Airport Terminals: The Issues Facing Dublin Airport. *Transportation Research Part A*, 40, pp. 181-203.
- [3] BARRETT, S.D. (2004). How do the Demands for Airport Services Differ between Full-service Carriers and Low-cost Carriers? *Journal of Air Transport Management*, Vol. 10(1), pp. 33-39.
- [4] ODONI, A.R. and DE NEUFVILLE, R. (1992). Passenger Terminal Design. *Transportation Research Part A*, 26A (1), pp. 27-35.
- [5] JIM, H.K. and CHANG, Z.Y. (1998). An Airport Passenger Terminal Simulator: A Planning and Design Tool. *Simulation Practice and Theory*, Vol. 6 (4), pp. 387-396.
- [6] BALLIS, A., STATHOPOULOS, E. and SFAKIANAKI, E. (2002). Sizing of Processing and Holding Air Terminal Facilities for Charter Passengers Using Simulation Tools. *International Journal of Transport Management*, Vol 1(2), pp. 101-113.
- [7] COAKES, S.J., Steed, L and Dzidic, P. (2006). *SPSS Version 13.0 for Windows; Analysis without Anguish*. Australia, John Wiley & Son.
- [8] SEKARAN, U. (2003). *Research Methods for Business: A Skill Building Approach*. 4 edit. New York, Wiley.