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General Authority of Civil Aviation

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CIVIL Aviation

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Weather Impacts on Aviation

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Dr. Faisal H. Al-Sugair *

The Aviation Industry and the Environmental Concerns

Environmental concern is clearly part of the current culture and as well one of the Islamic principles. To what extent this culture is deep-rooted varies from one society to another, and from one geographic region to another. Moreover, in a wider perspective, the concern for environment became part of the global trend so as to preserve our planet for future generations.

As aviation industry plays a leading role in this issue, there is a clear understanding and great awareness among its constituent members for the importance of contributing to this noble cause. There is an international trend to reduce the volume of wastes generated by this industry, all forms of wastes; gases, liquids, or solids. Efforts to encourage the use of biofuel in aircraft is but an initial indicator of aviation industry's growing concern for this good trend.

A few weeks ago, Hong Kong International Airport (HKIA) and forty of its business partners have undertaken a plausible initiative to make HKIA one of the World's greenest Airports. This is the first undertaken of its nature at the international level. The term "greenest" used here definitely implies taking care of environment, preserving it, and eliminating all impacts damaging to environment.

This deal was preceded by lots of work last year when HKIA started implementation of a 3-year environment plan that embraces a large group of goals and initiatives all designed to make HKIA "the leader" in this aspect world-wide. The announced strategy is centered around the Airport's commitment to three incontestable issues or slogans: Reducing, Reusing, and Recycling of wastes. Reducing usually refers to toxic gas emissions and to liquid and solid wastes as well. Reusing refers to paper and wooden products, oils, ..etc., while recycling refers to equipment, instruments, empty bottles, aluminum cans, plastic bags, ..etc.

To reduce gas emissions the Airport plans to gradually increase the number of electric vehicles within a scheduled plan that will end up making it the only option in all Airport services by 2017.

In the Kingdom of Saudi Arabia, we are seeing good initiatives, though in their early stages. There is an obvious awareness of this issue in the Kingdom's airports and there are attempts to give it more attention. Inspired by this the General Authority of Civil Aviation established special eco-protection units and departments in its international airports. It is now striving to introduce the latest technologies and regulations so as to make all its new airports environment friendly. In the new King Abdul-Aziz International Airport (KAIA) project, natural lighting is assumed, recycling of wastes, used water and other material is approved. GACA is keen to make the New KAIA Project fulfills GBCI standards to obtain LEED silver certificate.

Haramain High Speed Train Project, for example, will drastically reduce carbon emissions generated by other means of transport particularly land vehicles. These environment friendly trains will daily transport tens of thousands of passengers between Jeddah, Makkah, and Madina. KAIA Development Project will host a major train station for the Haramain High Speed Train so as to transport pilgrims and Umrah passengers to the two holy cities. In the Hajj season hundreds of thousands of pilgrims are already using another special train system to move about the Holy Places in Arafat, Mina, and Mozdalifa and soon to the Holy Mosque in Makkah. The other huge project is the North / South Train Project which will link the Kingdom's outstretched parts with each other and will cost more than 10 billion US Dollars. All these initiatives and projects show a good well, a nice dream coming true, and a great environmental achievement.

In addition to that the Kingdom has adopted a lot of legislations aiming to limit mans interference with environment urging people in the Kingdom to preserve the environment. The Kingdom has also established more than one governmental body to contribute to the strengthening of this noble civilized issue ■

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SAUDIA Joins SkyTeam

On May 29, 2012 SkyTeam, the global airline alliance, welcomed Saudia as its 16th member at a joining ceremony held in Jeddah. The flag carrier of Saudi Arabia, Saudia becomes SkyTeam's first member airline from the Middle East and gives the alliance a strong foothold in this important economic region.

From its hubs in Jeddah, Riyadh and Dammam, Saudia operates a comprehensive network throughout the Arabian Peninsula, the Indian Subcontinent and Northern Africa. Saudia adds 51 new destinations to SkyTeam's global network, including 23 within Saudi Arabia. Examples of new destinations are: Islamabad, Pakistan; Colombo, Sri Lanka; and Alexandria, Egypt.

"Saudia's membership adds value to the alliance by opening up the considerable Saudi Arabian market to our customers," said Michael Wisbrun, SkyTeam's Managing Director. "We are responding to passenger demand for increased travel choice within the Middle East by adding a significant player from the region. This allows us to offer more destinations, while continuing our focus on enhancing products and services for our global customers."

"Joining SkyTeam is an integral part of Saudia's long-term transformation strategy, which includes rebranding our airline, restructuring core operations and enhancing onboard products and airport services," said His Excellency Khalid Al-Molhem, Saudia's Director General. "We are proud to become SkyTeam's first Middle Eastern member and this milestone marks a momentous occasion in our airline's history. We look forward to a bright future as a SkyTeam member, offering a greater worldwide network and benefits to our customers."

Prior to joining SkyTeam, Saudia embarked on a four-year turnaround program, which will be completed by 2013. Other elements of Saudia's transformation plan include modernizing IT, commercial, operational and financial platforms and renewing the fleet by acquiring 90 new aircraft.

During the joining ceremony, Saudia unveiled two aircraft painted in SkyTeam livery. The aircraft are a Boeing B777-200 deployed on routes to Dubai, London, New York and Guangzhou, in addition to an Airbus A320 (reg. HZ-ASF) used primarily on routes to Europe and the UAE.

Kingdom Re-elected as ACAC EC Member

The General Authority of Civil Aviation of the Kingdom of Saudi Arabia was re-elected as a member of the Executive Council (the Governing Body) of the Arab Civil Aviation Commission, by acclamation in the elections that took place during the 16th Session of the ACAC Assembly, held on 16-18 May 2012.

H.H. President of General Authority of Civil Aviation, Prince Fahad Bin Abdullah, said that the re-election of the Kingdom for the membership for the Executive Council of the ACAC reflects an appreciation of its remarkable stature in the International Air Transport industry, and recognition of the its tremendous capabilities in terms of air navigation systems and Aviation Safety infrastructure.

The Kingdom was also re-elected as a member of the ACAC Air Transport, Aviation Security, Air Navigation, and Environment Committees . Prince Turki Bin Faisal, Vice President of GACA for International Organizations Affairs, was the Chief of the GACA Delegation to the ACAC Assembly.

GACA Writes off 50% of NAS Indebtedness

His Highness President of the General Authority of Civil Aviation, Prince Fahd Bin Abdullah issued a resolution calling for writing off 50% of the National Air Services Co. (NAS AIR) indebtedness to GACA. These debts include Airport Space Lease charges and ground handling services. The President's resolution comes within the context of GACA's policy aiming to support and encourage national air carriers and alleviate the burden falling upon national airlines operating in the domestic air transport sector. In addition to that this also comes in line with GACA's awareness of the challenges facing this airline with respect to high fuel prices and service charges. Moreover, from another perspective the resolution aims to activate the domestic transport investment environment.

The Kingdom Re-elected First Vice President of ACI Asia-Pacific Region

GACA's Vice President for International Orgnizations, Prince Turki bin Faisal has been unanimously re-elected for the second term as the First Vice President of the Airports Council International (ACI) Asia-Pacific Region during the ACI Regional Assembly meeting held on 23rd May 2012 in Singapore. In the ACI First Vice President's capacity, His Highness Prince Turki also sits in the ACI World Governing Board, a decision making body in the ACI organization.

ACI is the only association of the world's airports. Being the 'Voice of the World's Airports', the organization speaks on behalf of 1679 airports in 177 countries and territories worldwide including over 500 airports in Asia-Pacific Region.

The Asia-Pacific Region airports handled 1.43 billion passengers in 2011 and is now almost at par with North America and Europe. The theme for this Year's Conference is 'Transforming Airports: Innovations and Opportunities'. The Asia-Pacific region is the fastest growing region in the world with passenger traffic forecasted to reach 4.6 billion by 2029. As such airports in this region are aggressively increasing their capacity to handle this growth. Currently, 10 of the top 30 busiest airports are already in this region and this number is expected to increase. In terms of service standards, the top 5 airports in the world are also in this region. This region is seen as the most important region for aviation in the coming years.

The membership of this Association is continuously increasing as more and more airports are becoming members. At the Assembly this year, the Association has come up with new initiatives such as working together to handle crisis and natural disasters, attracting best talents and supporting smaller airports.

Weather Impacts on Aviation

Weather continues to play a significant role in a number of aviation accidents and incidents. While National Transportation Safety Board (NTSB) reports most commonly find human error to be the direct accident cause, weather is a primary contributing factor in 23 percent of all aviation accidents. The total weather impact is an estimated national cost of $3 billion for accident damage and injuries, delays, and unexpected operating costs.

By Dr. Mohamed Elfatih Elamin*

Thunderstorms and Other Convective Weather

Hazards associated with convective weather include thunderstorms with severe turbulence, intense up- and downdrafts, lightning, hail, heavy precipitation, icing, wind shear, micro bursts, strong low-level winds, and tornadoes. According to National Aviation Safety Data Analysis Center (NASDAC) analysis, between 1989 and early 1997, thunderstorms were listed as a contributing factor in 2-4 percent of weather-related accidents, depending on the category of aircraft involved. Precipitation was listed as a factor in 6% of commercial air carrier accidents, roughly 10 percent of general aviation accidents, and nearly 19% of commuter/ air taxi accidents. American Airlines has estimated that 55 percent of turbulence incidents are caused by convective weather

In addition to safety, convective weather poses a problem for the efficient operation of the NAS. Thunderstorms and related phenomena can close airports, degrade airport capacities for acceptance and departure, and hinder or stop ground operations. Convective hazards en route lead to rerouting and diversions that result in excess operating costs and lost passenger time. Lightning and hail damage can remove aircraft from operations and result in both lost revenues and excess maintenance costs.

In-Flight Icing:

In the period 1989-early 1997, the NTSB indicated that in-flight icing was a contributing or causal factor in approximately 11 percent of all weather-related accidents among general aviation aircraft. Icing was cited in roughly 6 %t of all weather-related accidents among air taxi/commuter and agricultural aircraft. The percentage was 3% for commercial air carrier accidents. The

In-flight icing is not only dangerous, but also has a major impact on the efficiency of flight operations. Rerouting and delays of commercial carriers, especially regional carriers and commuter airlines, to avoid icing conditions lead to late arrivals and result in a ripple effect throughout the NAS. Diversions en route cause additional fuel and other costs for all classes of aircraft.

Icing poses a danger to aircraft in several ways:

- Structural icing on wings and control surfaces increases aircraft weight, degrades lift, generates false instrument readings, and compromises control of the aircraft.
- Mechanical icing in carburetors, engine air intakes, and fuel cells impairs engine performance, leading to reduction of power.

Turbulence:

Non-convective turbulence is a major aviation hazard. All aircraft are vulnerable to turbulent motions. Non-convective turbulence can be





present at any altitude and in a wide range of weather conditions, often occurring in relatively clear skies as clear-air turbulence. Any aircraft entering turbulent conditions is vulnerable to damage; smaller aircraft (both fixed- and rotary-wing) are susceptible at lower levels of turbulent intensity than are large aircraft.

Ceiling and Visibility:

Low ceiling and reduced visibility are safety hazards for all types of aviation. The NASDAC study of NTSB statistics indicated that ceiling and visibility were cited as contributing factors in 24% of all general aviation accidents between 1989 and early 1997. They were also cited as contributing factors in 37% of commuter/air taxi accidents during the same period. Low ceiling and poor visibility accidents occur when pilots who are not properly rated or are flying an aircraft not equipped with the necessary instrumentation encounter such conditions, resulting in loss of control, or controlled flight into terrain.

Ground De-Icing:

Aircraft on the ground during periods of freezing or frozen precipitation and other icing conditions are susceptible to the buildup of ice on control surfaces, instrument orifices, propellers, and engine inlets and interiors. Aircraft that are moving along taxiway and runway surfaces in slush or standing water at near-freezing conditions are also susceptible to surface contamination, even after precipitation has stopped. Even a very small amount of ice on a wing surface can increase drag and reduce airplane lift by 25 percent. This type of ice accumulation has been a cause or a factor in 10 commercial aircraft takeoff accidents between 1978 and 1997. Ice blockage of airspeed or altitude measurement instrumentation can cause loss of control or navigation errors.

Volcanic Ash:

Aircraft hat traversed thin layer of ash required more maintenance. Statistics show that there are 575 active volcanoes globally which normally contribute to 50 eruptions, resulting in 50-75 “danger days” per year. Volcanic ash exceeds 30,000 feet on active air routes 25-30 days per year. There have been over 100 damaging encounters to aircraft in the last 20 years costing more than $250M in damages.

Efforts to mitigate risks to aviation industry attributable to weather elements will be discussed in the next magazine edition ■

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TIMING TRAVELLERS

HOW CAN AIRPORTS IMPROVE THEIR QUANTITATIVE PASSENGER ACTIVITY PERFORMANCE METRICS?

Most airlines and airports advocate passengers arriving at the airport at least an hour before departure. However, very little quantitative data is available that characterizes the duration and variation of time passengers spend on various arrival activities. Figure 1 is a block diagram that generally characterizes the passenger arrival activities, up to the point of clearing security and walking to the concourse.

Although the specific activities in this passenger arrival experience vary by traveler, this figure illustrates that there are several activities associated with arriving at an airport that consume some of the passengers' pre-arrival buffer time before a flight departs. Arguably the best passenger experiences occur when passengers have modest and predictable service times for their arrival activities from the point they arrive at the airport property until they clear security to the sterile concourse (Figure 1). Collecting quantitative data that characterizes the time spent in each of the activities is important to provide an objective framework for the various airport stakeholders to collaboratively identify how to provide a predictable airport arrival experience.

Arguably the best passenger experiences occur when passengers have modest and predictable service times

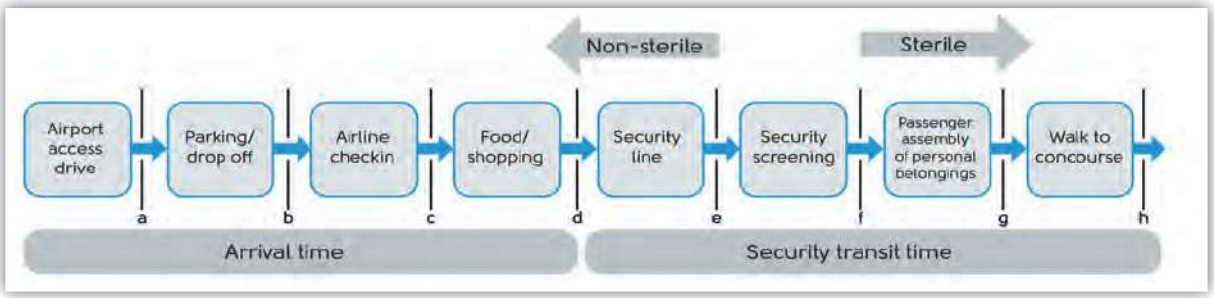
Modeling challenges

There is an extensive portfolio of academic literature on modeling queuing systems associated with parking, shuttle buses, check-in counters and security checkpoints. All of these techniques require detailed knowledge of passenger arrival characteristics and processing rates for each subsystem. To obtain all the model input parameters is arguably cost-prohibitive.

In the case of the security checkpoint, a great number of factors impact service rates on a daily and hourly basis. For example, during cold and rainy weather passengers wear additional clothing that takes more time to remove. Depending upon the time and day, the passenger composition (business versus leisure) can vary dramatically and affect processing time. Furthermore, part of the security screening process involves routinely changing practices, which further introduces stochastic variation in the throughput of a checkpoint.

Consumer electronics

Instead of using traditional modeling approaches to estimate queue times, it is more de-



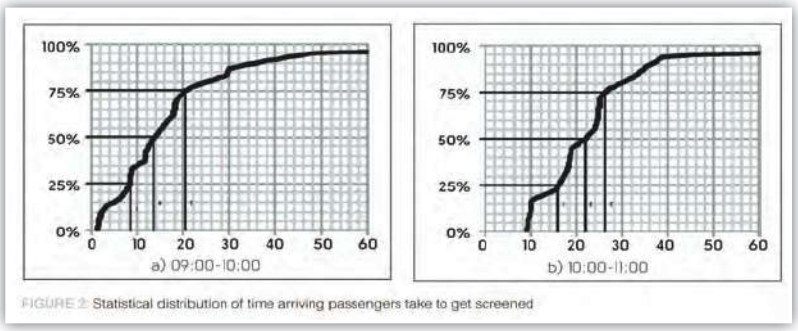


FIGURE 2: Statistical distribution of time arriving passengers take to get screened

sirable to directly evaluate this important performance measure. The traditional technique of distributing time-stamped cards to passengers joining the queue at security and collecting them at the document-checking station (Figure 1d and e) works okay, but it is resource intensive and consequently it is not feasible to collect hour-by-hour profiles and queue time. Furthermore, it is not easily extended to measure time spent on other arrival activities.

A number of consumer electronic devices now broadcast unique Bluetooth MAC addresses that can be read electronically within a 10-20m radius. If Bluetooth monitoring stations are located on both sides of a security checkpoint (Figure 1d and g), the time difference between observations provides a very good estimate of the time spent in the security screening process. With appropriate one-way hashing. data encryption and data destruction policies, this technique can reliably measure the duration of time passengers spend on various activities at the airport without compromising their privacy.

Characterizing wait time

Sample data from a pilot study conducted at George Bush Intercontinental Airport (IAH) in Houston, Texas, illustrates how Bluetooth consumer electronics can be leveraged to collect important airport performance measures.

Data that characterizes the time passengers spent traversing the security screening checkpoint at Terminal C at IAH is shown in Figure 2 for the hours of 09:00-10:00 and 10:00- 11:00 on 6 September 2010.

Between 09:00 and 1000 (Figure 2a):

- 25% of the passengers passed through the security checkpoint in less than 8.2 minutes;
- The median time (50th percentile) to pass through the security checkpoint is 13.6 minutes;
- 25% of the passengers take 20 minutes or more to pass through the checkpoint.

This variation in processing time is likely to be due to a combination of changes in checkpoint demand and variations in wait times associated with frequent and less frequent travelers passing through the same checkpoint.

Data integration opportunities

To provide context for these wait times it is important to understand the number of passengers that pass through the checkpoint (demand) and how many lanes are open at the time. Figure 3 provides a visual overview of the entire day's operation of a security checkpoint on an hour-by-hour basis.

- Figure 3a shows that the number of passengers passing through the checkpoint varies on an hourly basis. Between 09:00 and 10:00, approximately 850 passengers passed through the checkpoint (Figure 3a-i). Between 10:00 and 11:00, the number of passengers passing through the

checkpoint dropped to about 800 (Figure 3a-iv);

- Figure 3b characterizes the wait times on an hour-by-hour basis. For example, Figure 3b-ii shows the fastest 25%, median and slowest 25% security wait times illustrated in Figure 2a. Between 10:00 and 11:00, the median time to transit the security checkpoint increases substantially to 30 minutes (Figure 3b-v);
- Figure 3c documents how many lanes are open during any hour. By comparing Figure 3b-iii and Figure 3b-vi, it can be seen that one of the security lanes is closed between 10:00 and 11:00 and is the likely reason that the time to transit the security line increases during the hour.

The above example is intended to be illustrative and not to critique the staffing levels, as there are many other factors that contribute to staffing levels, such as wait times at other checkpoints in the airport, and unexpected changes in passenger volumes due to the

adjacent Labor Day weekend travel. The key point is to illustrate that when wait-time data is fused with other data, it can be used to create valuable management-level reports.

The future

Although Figure 1 is somewhat simplified and does not reflect some of the priority queues and passenger activities that occur on the sterile concourse prior to departure, it illustrates that many pre-departure activities consume varying amounts of a departing passenger's time.

Furthermore, technology has evolved to the point where it is now possible to collect performance measures assessing the time passengers spend on various activities, and develop systematic strategies for identifying opportunities for improving the airport experience.

Figure 2 shows how the time spent by passengers clearing security can vary significantly within an hour period as well as from hour to hour. Figure 3 shows the huge opportunity for integrating diverse data so that relationships between staffing levels, arrival rates and, ultimately, customer service can be assessed in an easy-to-understand graphical format.

Although this example is focused on a security checkpoint, clearly there are opportunities to extend this concept to assess many other components of departing and arriving passengers' airport experience. Further work is under way that characterizes the time passengers spend retrieving their bags from baggage claim and leaving the airport.

Darcy M. Bullock is a professor at Purdue University. This article was co-authored with Alex Hainen & Steve Remias from Purdue University; Lisa Kent, chief Information officer at Houston Airport System; and Darryl Daniel & Fedor Derek at Derek Consulting ■

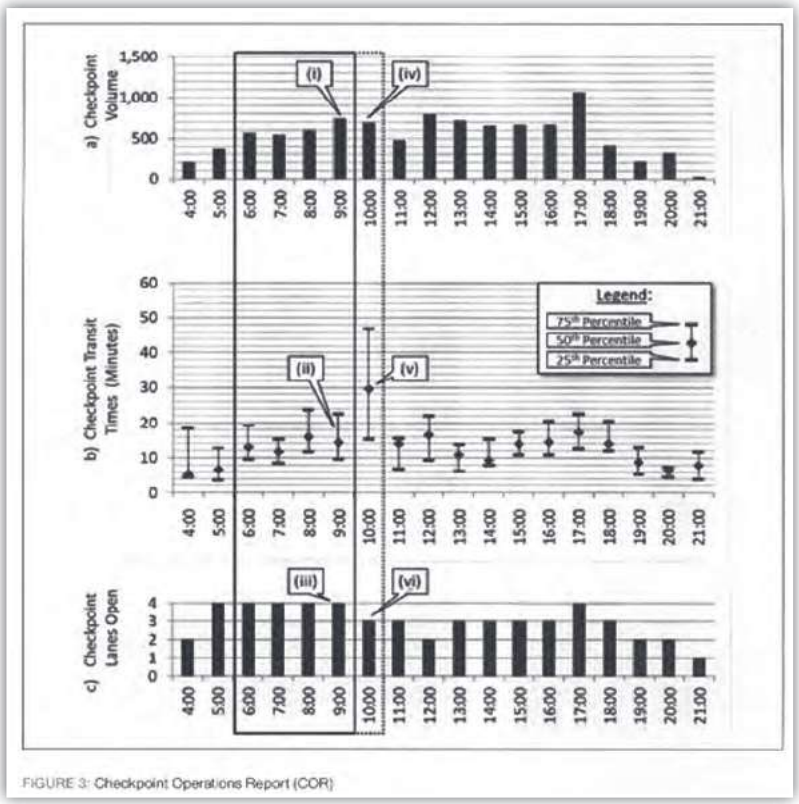


FIGURE 3: Checkpoint Operations Report (COR)

Source: Passenger Terminal World/ Showcase 2012


This is what innovation looks like.
Unsurpassed efficiency
Lower power and weight
Seat-centric architecture
Unmatched redundancy
Android™ OS
Rich content library
Award-winning design
Multi-task capability
THALES
Listen
Watch
Play
My Flight
Connect
Photos
Read
Where Are We?
Do Not Disturb
Personalize Experience
Screen Settings
TopSeries AVANT® In-Flight Entertainment is a born performer – pushing boundaries and arriving at industry-leading innovation that improves the passenger experience on all levels. Connectivity ready, the system supports both air-to-ground SATCOM and onboard wireless solutions. Chosen by 5-Star Airlines™ and winner of both Avion and Crystal Cabin awards.
To find out more, scan the QR code or visit thales-ifec.com
Android™ is a trademark of Google®, Inc.
THALES
Together • Smarter • Safer

Creaking Airports Hamper SE Asia Carriers

It's a scene repeated endlessly at most of Southeast Asia's main airports - planes forced to circle overhead or idle on the tarmac and passengers stuck in long lines at immigration desks, security checkpoints and baggage carousels.

And it's likely to get worse in capitals such as Jakarta, Bangkok and Manila in years to come as overcrowded airports and outdated infrastructure are twinned with a huge spike in the number of aircraft in the region.

Southeast Asian carriers have ordered USD$47 billion worth of aircraft for the coming decade but the deals could be under threat because of the inability of airports to keep pace. That could be a blow to manufacturers Boeing and Airbus.

Jakarta's Soekarno-Hatta Airport now serves more than 51 million passengers a year, more than twice its design capacity when it was built in the mid-1980s.

Bangkok's main Suvarnabhumi Airport is often beset by two-hour immigration queues and is running over capacity less than six years after it opened, which led Thailand's government to encourage low-cost carriers to move to the old Don Muang Airport to help ease congestion.

With pressure from Air Asia and scenes of chaotic check-ins, government-linked operator Malaysia Airports is rushing to complete another budget terminal that is due to be up and running by April 2013.

Projected construction costs have nearly doubled to MYR3.9 billion ringgit (USD$1.27 billion) as the planned capacity of the new airport has been expanded to 45 million passengers a year from an initial plan of 30 million.

TIME IS MONEY

Jakarta's airport is infamous for planes sitting for nearly an hour on the tarmac before take-off or circling overhead as they await their turn to land. One-hour flights between Singapore and the Indonesian capital can easily drag to two hours or more because of the overcrowded runway.

The number of low-cost carriers (LCC) and their routes has expanded rapidly in Southeast Asia over the last 10 years. Analysts and industry executives see more growth ahead due to a lack of reliable alternatives and strong economic growth.

"Ten years ago, the airports in this region would probably not

have foreseen that LCC demand could be as strong as it is today," Chin Yau Seng, chief executive of Singapore-based budget carrier Tiger Airways said.

Lion recently firmed up an order for 230 Boeing 737s worth USD$22.4 billion, eclipsing the record for the world's biggest commercial aircraft deal set by Air Asia when it signed up to buy 200 Airbus A320neo jets for USD$18 billion.

Despite the growth and big orders, Southeast Asia remains a market that has been under served by carriers.

Con Korfiatis, vice president of Garuda Indonesia's budget carrier Citilink, said only 300 single-aisle jets serve the country's population of 230 million, compared with 3,000 in the United States, which has 310 million people.

Boeing sees Asia-Pacific carriers as the biggest buyers of planes over the 20-year period to 2030 as they are expected to acquire 11,450 passenger jets valued at USD$1.5 trillion - more than a third of global demand.

RACING AGAINST THE CLOCK

Standard & Poor's analyst Shukor Yusof said Indonesia and the Philippines are among the laggards in developing facilities for airlines, while Singapore and Malaysia tend to move ahead.

"Malaysia has done a fairly good job in managing and operating various airports," he said. "Indonesia certainly lacks the infrastructure to meet the increase in capacity with its domestic carriers expanding and acquiring new aircraft."

Singapore's Changi Airport plans to build a fourth terminal that will boost total capacity to 82 million passengers a year from the current 73 million when it is completed in 2017.

Despite Changi's reputation for planning ahead, the Centre for Asia Pacific Aviation (CAPA) said the fourth terminal might not be enough to meet the expected surge in air travel.

Changi's average annual passenger growth has been 12% in each of the past two years, far higher than the average for the past seven years of 8%

That momentum carried on in January with an annual growth rate of 12.1%and in February with 11.2%.

"At 12%t per annum growth rate, Changi would reach the post-Terminal 4 capacity figure of 82 million in 2016, just as Terminal 4 finally opens. Even based on 8% rate, a fifth terminal would be needed by the end of this decade," CAPA said.

At Jakarta's Soekarno-Hatta, a major overhaul is in the works. It introduced a third terminal last year as it looks to boost capacity to 62 million passengers per year by 2014, a substantial jump from the 51 million the clogged airport now handles.

It also plans a third runway and fourth terminal that could potentially triple its capacity, measured by aircraft movement, but the plan has been hindered by land acquisition issues that might force authorities

Source: www.airwise.com

Top 30 North American Airports
Traffic Results 2011

Rank	City-Airport code	Passengers (in million)	% Change
1	ATLANTA, GA (ATL)	92.39	▲3.5
2	CHICAGO, IL (ORD)	66.66	▼0.1
3	LOS ANGELES, CA (LAX)	61.86	▲4.7
4	DALLAS/FORT WORTH, TX	57.74	▲1.5
5	DENVER, CO (DEN)	52.85	▲1.7
6	NEW YORK, NY (JFK)	47.68	▲2.5
7	SAN FRANCISCO, CA (SFO)	40.81	▲4.3
8	PHOENIX, AZ (PHX)	40.59	▲5.3
9	LAS VEGAS, NV (LAS)	40.56	▲2.0
10	HOUSTON, TX (IAH)	40.13	▼ 0.9
11	CHARLOTTE, NC (CLT)	39.04	▲2.1
12	MIAMI, FL (MIA)	38.31	▲7.3
13	ORLANDO, FL (MCO)	35.43	▲1.6
14	NEWARK, NJ (EWR)	33.71	▲1.8
15	TORONTO, ON, CANADA (YYZ)	33.44	▲4.2
16	MINNEAPOLIS, MN (MSP)	33.12	▲0.8
17	SEATTLE, WA (SEA)	32.47	▲2.9
18	DETROIT, MI (DTW)	32.41	▲0.1
19	PHILADELPHIA, PA (PHL)	30.84	▲0.2
20	BOSTON, MA (BOS)	28.91	▲5.4
21	NEW YORK, NY (LGA)	24.12	▲0.6
22	FORT LAUDERDALE, FL (FLL)	23.35	▲4.2
23	WASHINGTON, DC (IAD)	23.06	▼2.3
24	BALTIMORE, MD (BWI)	22.39	▲2.1
25	SALT LAKE CITY, UT (SLC)	20.39	▼2.4
26	WASHINGTON Reagan, (DCA)	18.80	▲3.8
27	CHICAGO, IL (MDW)	18.78	▲7.0
28	HONOLULU, HI (HNL)	17.95	▼ 2.7
29	VANCOUVER, BC, CANADA	17.03	▲1.5
30	SAN DIEGO, CA (SAN)	16.89	0.0

Passengers enplaned and deplaned, passengers in transit counted once.

Rank	City-Airport code	Cargo	% Change
1	MEMPHIS, TN (MEM)	3,916,410	0.0
2	ANCHORAGE, AK (ANC)	2,543,105	▼3.9
3	LOUISVILLE, KY (SDF)	2,188,422	▲1.0
4	MIAMI, FL (MIA)	1,841,929	▲0.3
5	LOS ANGELES, CA (LAX)	1,681,611	▼3.8
6	NEW YORK Kennedy, NY (JFK)	1,348,992	▼0.5
7	CHICAGO, IL (ORD)	1,311,622	▼4.7
8	INDIANAPOLIS, IN (IND)	971,664	▼4.0
9	NEWARK, NJ (EWR)	813,209	▼5.0
10	ATLANTA, GA (ATL)	663,162	▲0.6
11	DALLAS/FORT WORTH, TX	654,415	▼8.0
12	TORONTO, ON, CANADA (YYZ)	492,660	▲2.5
13	OAKLAND, CA (OAK)	483,375	▼5.4
14	CINCINNATI, OH (CVG)	481,669	▲29.7
15	HOUSTON, TX (IAH)	446,328	▲5.4
16	PHILADELPHIA, PA (PHL)	415,205	▼1.1
17	SAN FRANCISCO, CA (SFO)	382,019	▼10.5
18	ONTARIO, CA, CANADA (ONT)	378,728	▲6.4
19	HONOLULU , HI (HNL)	327,331	▼25.7
20	WASHINGTON, Dulles (IAD)	302,661	▼8.9
21	SEATTLE, WA (SEA)	279,625	▼1.3
22	PHOENIX, AZ (PHX)	274,046	▲9.3
23	BOSTON, MA (BOS)	251,520	▼3.1
24	DENVER, CO (DEN)	248,141	▼1.4
25	SALT LAKE CITY, UT (SLC)	233,143	▲60.3
26	VANCOUVER, BC, CANADA	223,878	▼2.0
27	MINNEAPOLIS, MN (MSP)	208,636	▼1.4
28	DETROIT, MI (DTW)	206,426	▲6.8
29	PORTLAND, OR (PDX)	194,513	▲2.3
30	WINNIPEG, MB, CANADA	174,436	▲0.8

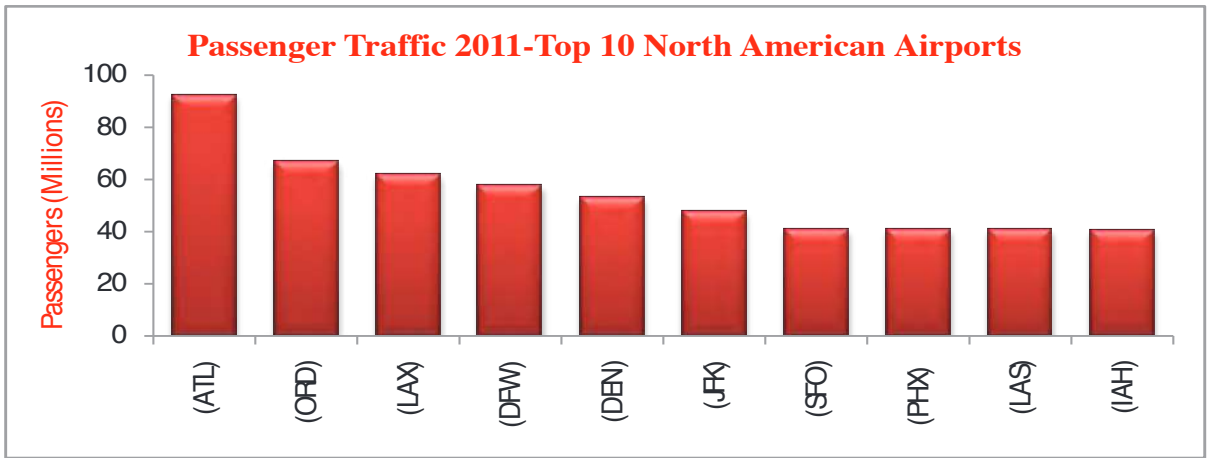
Total Cargo: Loaded and unloaded freight and mail in metric tons. Data includes transit freight.

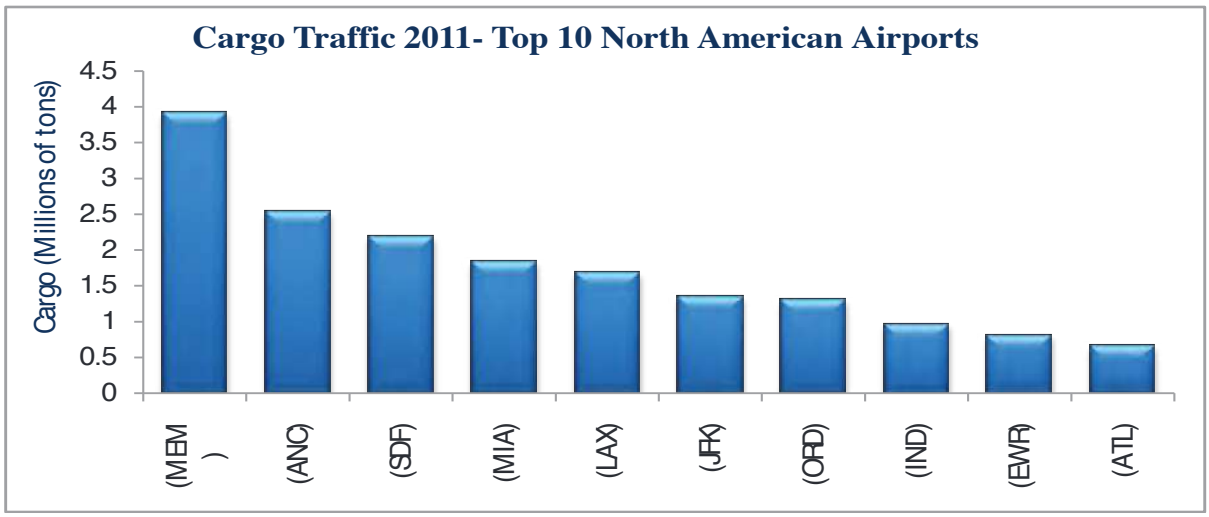
Rank	City-Airport code	Movements	% Change
1	ATLANTA, GA (ATL)	923,996	▼2.7
2	CHICAGO, IL (ORD)	878,798	▼ 0.4
3	LOS ANGELES, CA (LAX)	702,895	▲5.4
4	DALLAS/FT WORTH, TX (DFW)	646,803	▼ 0.8
5	DENVER, CO (DEN)	628,796	▼ 0.2
6	CHARLOTTE, NC (CLT)	539,842	▲2.0
7	LAS VEGAS, NV (LAS)	531,538	▲5.1
8	HOUSTON, TX (IAH)	517,262	▼2.7
9	PHOENIX, AZ (PHX)	461,989	▲2.8
10	PHILADELPHIA, PA (PHL)	448,129	▼ 2.7
11	DETROIT, MI (DTW)	443,028	▼ 2.1
12	MINNEAPOLIS, MN (MSP)	436,506	0.0
13	TORONTO, ON, CANADA (YYZ)	428,477	▲2.4
14	NEW YORK, NY (JFK)	411,226	▲3.1
15	SAN FRANCISCO, CA (SFO)	403,564	▲4.2

Rank	City-Airport code	Movements	% Change
16	NEWARK, NJ (EWR)	399,141	▲0.2
17	MIAMI, FL (MIA)	394,572	▲4.9
18	BOSTON, MA (BOS)	368,987	▲4.6
19	NEW YORK, NY (LGA)	366,597	▲1.2
20	SALT LAKE CITY, UT (SLC)	358,002	▼ 1.3
21	LONG BEACH, CA (LGB)	341,577	▲11.6
22	WASHINGTON, DC (IAD)	327,493	▼ 2.7
23	PHOENIX, AZ (DVT)	317,443	▼13.9
24	SEATTLE, WA (SEA)	314,947	▲0.3
25	MEMPHIS, TN (MEM)	311,791	▼7.2
26	ORLANDO, FL (MCO)	309,884	▲0.7
27	LOS ANGELES, CA (VNY)	301,793	▼4.7
28	VANCOUVER, BC, CANADA	296,942	▲0.2
29	ANCHORAGE, AK (ANC)	290,033	▼0.1
30	WASHINGTON, DC (DCA)	281,770	▲3.9

Total Movements: landing + take off

Source: ACI - Airports participating in the ACI Annual Traf¿c Statistics Collection


Passenger Traffic 2011-Top 10 North American Airports
Passengers (Millions)
100
80
60
40
20
0
(ATL)
(ORD)
(LAX)
(DFW)
(DEN)
(JFK)
(SFO)
(PHX)
(LAS)
(IAH)


Cargo Traffic 2011- Top 10 North American Airports
Cargo (Millions of tons)
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
(MEM)
(ANC)
(SDF)
(MIA)
(LAX)
(JFK)
(ORD)
(IND)
(EWR)
(ATL)


Aircraft Movements 2011- Top 10 North American Airports
Movements (Thousands)
1000
900
800
700
600
500
400
300
200
100
0
(ATL)
(ORD)
(LAX)
(DFW)
(DEN)
(CLT)
(LAS)
(IAH)
(PHX)
(PHL)

Source: ACI

Forthcoming Aviation Conferences, Exhibitions & Seminars

1 July – 31 August 2012

4 - 6 July
International Aviation Finance
Dorking, Surrey, UK
euromoneyseminars.com/Calendar.aspx?CategoryID=0

4 - 7 July
Marketing & Communications and JumpStart® Air Service Development Conference
Sacramento, CA, USA
aci-na.org/event/548

5 - 6 July
Joint Conference on Enhancing Air Cargo Security and Facilitation
Singapore, Singapore
icao.int/Meetings/JointConferenceEACSF/

8 - 10 July
Air Traffic Routes Africa
Victoria, Seychelles
routesonline.com/events/

9 - 15 July
Farnborough International Airshow
Farnborough, UK
farnborough.com/

10 - 11 July
Aviation Outlook China 2012
Shanghai, China
terrapinn.com/2012/aviation-outlook-china/

33rd Plenary Session, European Civil Aviation Conference (ECAC)
Strasbourg, France
ecac-ceac.org///index.php/conference/

10 - 12 July
Airline Operational Communications (AOC)
Englewood, CO, USA
aviation-ia.com/events/index.html

15 - 17 July
AAAE Airports Conference of the Americas
San Jose, Costa Rica
events.aaae.org/sites/120603/

15 - 19 July
42nd International Conference on Environmental Systems
San Diego, CA, USA
aiaa.org/ICES2012/

16 - 17 July
AAAE/ALA Summer Legislative Issues Conference
Washington, DC, USA
events.aaae.org/sites/120702/index.cfm

Small Airports Conference
Grand Rapids, MI, USA
aci-na.org/event/562

Simulated Air Traffic Control Environment (SATC)
Kastrup, Denmark
aviation-ia.com/events/index.html

17 July
CANSO Middle East Safety Seminar
Amman, Jordan
canso.org/mesafetyseminar2012

17 - 19 July
Electronic Flight Bag (EFB)
Seattle, WA, USA
aviation-ia.com/events/index.html

18 - 19 July
Fourth Annual ACC/TSA Security Capabilities Day
Arlington, VA, USA
acconline.org/i/ACC_Events/

18 - 25 July
Classic Aircraft Meeting
Hedlanda, Australia
aircraftmeeting.com/eng.htm

19 July
Mexico Airport Development Opportunities
London, UK
adsgroup.org.uk/articles/29944

22 - 25 July
Southwest Chapter AAAE Annual Conference and Exposition
Santa Rosa, CA, USA
swaaae.org/

43rd Annual Florida Airports Council Conference & Exposition
Naples, FL, USA
floridaairports.org/meetings/meetings.asp?id=46

23 - 25 July
Airports World Australia Pacific
Sydney, Australia
terrapinn.com/conference/airports-world-australia-pacific/

Aviation Outlook Australia Pacific
Sydney, Australia
terrapinn.com/conference/aviation-outlook/

23 - 26 July
Aviation Outlook Africa
Johannesburg, South Africa
terrapinn.com/conference/aviation-outlook-africa/

23 - 29 July
EAA: Air Venture Oshkosh
Oshkosh, WI, USA
eaa.org/calendar/eventdetail.aspx?id=7013

2 - 3 August
Regional Leadership Conference
Atlanta, GA, USA
aiaa.org/EventDetail.aspx?id=10484

2 - 5 August
Great Lakes Chapter AAAE Annual Conference
Appleton, WI, USA
glcaaae.org/index.php?

4 - 10 August
Aviation Industry Conference Week
Rotorua, New Zealand
aia.org.nz/Events/Conference+2012.html

5 - 7 August
AAAE/NW Chapter AAAE Airport Facilities Management Conference
Colorado Springs, CO, USA
events.aaae.org/sites/120804/

7 August
Commercial Operators Tax Seminar
Scottsdale, AZ, USA
nata.aero/Event.aspx

13 - 16 August
2012 Public Safety & Security Fall Conference
Arlington, VA, USA
aci-na.org/event/1753

AIAA Guidance, Navigation, and Control and Co-located Conferences
Minneapolis, MN, USA
aiaa.org/GNC2012/

14 - 16 August
First Annual FAA Flight Standards Asia-Pacific Meeting
Long Beach, CA, USA
faa.gov/news/conferences_events/2012_asia_pac/

16 - 18 August
4th Annual BALA Summit: Business Aviation in Latin America
Sao Paulo, Brazil
aeropodium.com/cp/bala.html

16 - 19 August
Interaerocom Saint-Petersburg
St. Petersburg, Russia
biztradeshows.com/trade-events/interaerocom-saint-petersburg.html

18 - 21 August
Air Carriers Purchasing Conference (ACPC)
Las Vegas, NV, USA
acpc.com/

18 - 22 August
Northeast Chapter AAAE Annual Conference and Exposition
Providence, RI, USA
necaaae.org/cfiles/home.php

19 - 22 August
AAAE/IAAE Conference: The Evolution of the Airport and Air Carrier Industry
Montreal, QB, Canada
events.aaae.org/sites/120801/index.cfm

27 - 29 August
21st ACI Africa General Assembly Conference & Exhibition
Livingstone, Zambia
aci.aero/

28 - 29 August
The Future of Dredging Conference
Rio de Janeiro, Brazil
quaynote.com/ankiti/www/?code=dred12&f=home

Asia Pacific Airline Training Symposium
Singapore, Singapore
halldale.com/apats-2012

28 - 30 August
AOPA Shanghai International General Aviation Show
Shanghai, China
sh-aero.com/en/

CANSO Unmanned Aircraft Systems Subgroup Meeting
Zurich, Switzerland
canso.org/cms/showpage.aspx?id=4258

28 - 30 August
International Society of Air Safety Investigators Annual Seminar
Baltimore, MD, USA
isasi.org/isasi2012.html