

# **REPORT ON AIR TRAFFIC FORECASTING TECHNIQUES**

*(BAHRAIN 28 - 30 OCTOBER 2007)*

## **1. INTRODUCTION**

1.1 A Workshop on Air Traffic Forecasting Techniques was organized from 28 to 30 October 2007 in Bahrain by the International Civil Aviation Organization (ICAO) in collaboration with the Civil Aviation Affairs of Bahrain.

1.2 The Workshop was organized in compliance with ICAO Assembly Resolution and the Middle East Air Navigation Planning and Implementation Regional Group (MIDANPIRG) Conclusion 9/58. The objective of the workshop was to improve forecasting capacity of the concerned staff of States of the region. It should be recalled that the Second Meeting of the MIDANPIRG Traffic Forecasting Sub-Group held in Cairo in March 2006 agreed that MID States be encouraged to host workshops and seminars in a view to improve traffic forecasting capabilities of the region. During these workshops/seminars, issues, such as defining a format of the analyzed data to be supplied by States, could be discussed and possibly presented to MIDANPIRG as an amendment to MIDANPIRG/9 Conclusion 9/58.

1.3 It was in that regard that Bahrain has generously offered to host the workshop and bear the cost for the participation of the ICAO staff (HQ and Regional Office).

1.4 The workshop was attended by 36 participants from 9 States (Bahrain, Egypt, Iran, Jordan, Kuwait, Pakistan, Sudan, Tunisia, and UAE) and by Mr. Chaouki Mustapha and Mr. Zubair Anwar from ICAO Headquarters and by Mr. Evalou Gngang from the MID Office. It was opened by Captain Abdulrahman Al Gaoud, UnderSecretary for Civil Aviation Affairs (CAA) of Bahrain. Accompanying him were also Mr. Mohamed Khonji, Regional Director, ICAO Middle East Regional Office and Mr. Ahmed Neamat Ali, Assistant UnderSecretary for CAA. In his opening speech, Captain Al Gaoud welcomed all participants to Bahrain and stressed the need for adequate forecasts to help States in the region plan their aviation infrastructure, especially considering the air traffic growth achieved.

1.5 Mr. Mohamed Khonji, in addressing the participants, expressed the Organization's gratitude to the Kingdom of Bahrain for the support and assistance that the Kingdom has always provided to the MID Office. He particularly outlined the support His Excellency Shaikh Ali Bin Khalifa Al-Khalifa, Deputy Prime Minister has always provided to ICAO among which the hosting by Bahrain of the Regional Monitoring Agency (RMA) when it was particularly difficult to find a hosting State.

## **2. DISCUSSION**

2.1 Mr. Chaouki Mustapha, Economist at the Economic Analyses and Databases Section of HQ who conducted the workshop was assisted by Mr. Evalou Gngang, RO/AT and Mr. Zubair Anwar, Economic Assistant from the Economic Analyses and Databases Section.

2.2 Topics covered during the workshop include ICAO's activities in the field of forecasting and economic planning, the relationship between statistics, forecasting and economic planning, forecasting methodologies, airport forecasting and planning, CNS/ATM economic aspects and business case development. The forecasting methodologies were given special attention and a presentation on an ICAO forecasting model was given to participants in order to familiarize them with the process of developing a model as well as the tools and procedures employed.

2.3 One day was reserved for the exercise session which was performed using about 20 laptop computers. Using world traffic and economic data, participants were guided step-by-step to manipulate data, develop time series and develop forecast models. This exercise was based on a new manual, prepared by EAD, describing in detail the approach to regression analysis using MS Excel. Explanations such as how to analyze the data, correct the inconsistencies, check the model statistical parameters and the significance of the results etc., were provided to the participants as they followed the lead of the presenter. The exercises were completed by developing a final econometric model for world air traffic demand. The participants were made aware that the model must be checked through a series of tests before it can be used for developing forecasts. Once it was understood that the model was statistically significant, a forecast to the year 2015 was produced.

2.4 A sensitivity analysis was also carried out by developing a “low” and a “high” forecasts for the same period. This exercise session provided all participants enough knowledge to practice regression analysis on their own, hence traffic and economic data for the Middle East region was given to them as a homework assignment to practice, analyze and prepare models and develop forecasts.

2.5 An illustration of airport peaking for Dubai and Bahrain airports (using OAG data) in terms of monthly, weekly, daily and hourly peaks was presented. A presentation on peak-period analyses of Muscat FIR was also presented. The airport and FIR peaking was of particular concern to the participants as the majority of them were from the airport and air traffic control side. All participants were of the opinion that due to the exceptionally high traffic growth experienced by the region, there is an urgent need to focus on airport and FIR peaks in much more detail.

2.6 Special attention was given to the report of the Second Meeting of Traffic Forecasting Sub-Group (TF SG/2) in particular to the Ninth Middle East Air Navigation Planning and Implementation Regional Group MIDANPIRG/9 **Conclusion 9/58: Traffic Forecasting Requirements In the MID Region:** “that, *MID States continue their support to the TF SG by ensuring that their respective nominees to the membership of the Sub-group include, as much as possible, forecasting experts, air traffic management experts and, when required, financial analysts to carry out business case and cost/benefit analyses*”.

### 3. CONCLUSIONS

3.1 All participants filled an evaluation form on the last day and almost all of them rated the workshop to be excellent; they thought that the presentations were clear and pertinent to their needs and felt that they had benefited well from the exercise session. Many participants mentioned that three days were insufficient and they would have liked to do more exercises. Some of the main outcomes from this workshop are as follows:

- Good quality data and statistics are basic requirements to any forecasting and planning effort. Given the importance of civil aviation data collection, analysis and dissemination, participants felt that it would be very beneficial to both States in the region and ICAO to have a workshop organized in the near future on the topic of civil aviation data collection processes.

- More support should be provided by ICAO to States in the region in the field of forecasting, especially for airports experiencing very fast growth driven by airlines with fast expanding networks and fleets. This can be achieved through the collection, development and dissemination of material on the appropriate methods and techniques.
- The MIDANPIRG Traffic Forecasting Sub-Group (TF SG) remains the main body for the development of civil aviation forecasts in the region. Membership of the Sub-Group should include, in addition to air traffic controllers, air transport officers as well as financial officers.

***Attachment:***

Attachment A – List of Participants

## LIST OF PARTICIPANTS

NAME	TITLE & ADDRESS
<p><b><u>STATES</u></b></p> <p><b>BAHRAIN</b></p> <p>Mr. Saleem Mohamed Hassan</p>	<p>Chief Air Traffic Management Ministry of Transportation Civil Aviation Affairs P.O. Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 321 992 Tel: (973) 17 321 117 Mobile: (973) 39 608 860 E-mail: saleemmh@caa.gov.bh</p>
<p>Mrs. Ebtesam Mohamed Al Shamlan</p>	<p>Head of Permission and Airline Schedule Civil Aviation Affairs Bahrain International Airport B.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17 333 278 Tel: (973) 17 321 169 Mobile: (973) 39 469 557 Email: ealshamalan@caa.gov.bh)</p>
<p>Mrs. Jalila S. Murtada Ebrahim Ahmed</p>	<p>Senior Marketing and Promotion Specialist Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973)17321139 Tel: (973)17321077 Mobile: 39453845 E-mail: jmurtada@caa.gov.bh</p>
<p>Mr. Abdul Hakeem Al-Saibani</p>	<p>Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Tel: (973) 17329176 Mobile: 39400011</p>
<p>Mr. Yahya Ali Hassan</p>	<p>Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Tel: (973) 17329064 Mobile: 396666049 E-mail: yah22@yahoo.com</p>

NAME	TITLE & ADDRESS
Mr. Nabeel Al-Mahmood	Gulf Air P.O.Box 586 KINGDOM OF BAHRAIN Tel: (973) 17338474 Mobile: 39670664 E-mail : nabeel.almahmoud@gulfair.com
Mrs. Aameena Ahmed Al-Madhoob	Architect/ Engineer Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17333256 Tel: (973) 17321097 Mobile : 39577029 E-mail: aalmadhoob@caa.gov.bh
Mrs. Amna Mohammad Al-Kassimi	Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) (973) 17333256 Tel: (973) 17329108 Mobile : 39698291 E-mail : aalkassimi@caa.gov.bh
Mr. Habib Ali Al Ali	Chief Meteorological Operations Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17320630 Tel: (973) 17321172 Mobile: 39611576 E-mail: halaali@caa.gov.bh
Mr. Ismail Mohammad Al Alawi	Head of Corporate Planning Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 17321194 Tel: (973) 17321020 Mobile: 97339660079 E-mail: Imalalwi@hotmail.com
Ms. Nouf Ali Fakhroo	Civil Aviation Affairs P.O.Box 586 KINGDOM OF BAHRAIN Fax: (973) 333278 Tel: (973) 173 29011 Mobile: (973) 367 86 868 E-mail: nfakhroo@caa.gov.bh

NAME	TITLE & ADDRESS
<p><b>EGYPT</b></p> <p>Mr. Mokhtar Fahmi Mohamed Ahmed</p>	<p>Senior Air Traffic Control &amp; Director of External Relations, National Air Navigation Services Company                      Ministry of Civil Aviation Cairo                      International Airport Road                      Cairo - EGYPT                      Fax: (202) 22680617                      Tel: (202) 2269 0057 or 22680617                      Mobile 0101275019                      E-mail: mkaoud@ gmail.com &amp; kaoud57@yahoo.com</p>
<p>Mr. Mostafa Attia Aly Kaoud</p>	<p>Information and Decision Support Centre Manager                      National Air Navigation Services Company                      Ministry of Civil Aviation Cairo                      International Airport Road                      Cairo - EGYPT                      Fax: (202) 22680617                      Tel: (202) 2269 0057 or 22680617                      Mobile: 0128839963                      E-mail: mkaoud@ gmail.com &amp; kaoud57@yahoo.com</p>
<p>Mr. Ragi Shafik Nashed</p>	<p>Senior Air Traffic Inspector                      Civil Aviation Authority                      Cairo Egypt                      Tel.: (202) 2497682                      Mobile: (202) 010 18117227</p>
<p>Mr. Michel Youssef Naim Finan</p>	<p>Senior ATC Inspector                      Civil Aviation Authority                      Airport Road, Cairo, Egypt                      Tel.: (202) 227929549                      Mobile: (202) 0101096295                      E-mail: mckyyt@hotmail.com</p>
<p><b>ISLAMIC REPUBLIC OF IRAN</b></p> <p>Mr. Mohammad Khodakarami</p>	<p>Deputy Director General ATC                      Tehran Mehrabad International Airport                      Civil Aviation Organization                      P.O. Box 13445 – 1798                      Tehran - ISALAMIC REPUBLIC OF IRAN                      Fax: (9821) 44544102                      Tel: (9821) 44544101                      Mobile: 0099123908196                      E-mail: mkhd 4444.yahoo.com</p>

NAME	TITLE & ADDRESS
<b>JORDAN</b>  Mr. Abdulla Ali Alnsour	Jordan Civil Aviation Regulatory Commission, P.O.Box 7547 Amman - JORDAN Fax: (962-6) 4897485 Tel: (962-6) 489 1705 Mobile: 962 795214182 E-mail: cerairlines@jcaa.gov.jo
<b>KUWAIT</b>  Mr. Ahmad Al-Sultan	Statistical Analyst Directorate General of Civil Aviation Kuwait International Airport P.O. Box 17 Safat 13001 State of KUWAIT Tel: (965) 9615400 E-mail: alsultan67@hotmail.com
Mr. Yahya Al-Wathiqi	Statistical Analyst Directorate General of Civil Aviation Kuwait International Airport P.O. Box 17 Safat 13001 State of KUWAIT Fax: (965) 4346528 Tel: (965) 9019853
Mr. Ibrahim M.H. Dashti	Deputy Head of Statistic Section, Directorate General of Civil Aviation P. O.Box. 2118 Hawalli 32022 Kuwait Tel: 965 180 ext. 1437 Mobile: (965) 9674185 E-mail: imdashti@yahoo.com
<b>PAKISTAN</b>  Mr. Rashid Rasheed Zuberi	Corporate Manager ATS Civil Aviation Authority Karachi - PAKISTAN Fax: (9242) 92219248758 Tel: (9242) 92219248134 Mobile: 92213008239470 E-mail: Saleem.Athar@caapakistan.com.pk <i>Or</i> rrz_63@hotmail.com

NAME	TITLE & ADDRESS
<b>SUDAN</b>  Mr. Abubakr Mansour Saeed Adam	Director of Technical Directorate Khartoum Airport Civil Aviation Authority Khartoum Airport Khartoum - SUDAN Fax: (249) 183775925 Tel: (249) 183788192 or 837844925 Mobile: (249) 918 8239085 E-mail: saeed.caa@gmail.com
Mr. ElFadil Ibrahim Bakheet Mohamed	Civil Aviation Authority Khartoum Airport Khartoum - SUDAN Fax: (249) 183774322 Tel: (249) 183774322 Mobile: 00249912285216 E-mail: fadilibrahim@yohoo.com
Mr. El Sadig Ibrahim Abo El Gaseem	Statistic Inspector CAA Sudan Planning & Development Directorate Directorate P.O.Box 430 Khartoum - SUDAN Fax: (249) 8378 2706 Tel: (249) 8378 2706 Mobile: (249) 91 229 4363 Email: Elsadig72@gmail.com
Mr. Hashim Mohamed Ahmed	SATCO& Ass. Director Civil Aviation Authority Khartoum Airport Khartoum - SUDAN Fax: (249) 183773652 Tel: (249)183784925 or 183788192 Mobile: 249912382433 E-mail: bengen404@gmail.com
Mr. Shakir Salah Eldin Mohamed Saeid	Senior Air Traffic Controller, Air Navigation Services Directorate Civil Aviation Authority Khartoum Area Control, Centre Khartoum - SUDAN Fax: (249) 183773632 Tel: (249) 183783766 Mobile: (249) 912366449 E-mail: shakir.caa@gmail.com
Mrs. Samia Adlan Mohamed Ali	Planning and Dev. Directorate Civil Aviation Authority Khartoum - SUDAN Fax: (249) 8378 2706 Tel: (249) 837782706 Mobile: (249) 918249997 E-mail: samiaadlan@yohoo.com



NAME	TITLE & ADDRESS
<p><b>TUNISIA</b></p> <p>Mr. Naffouti Larbi</p>	<p>Manager Civil Aviation of Tunisia            Fax: 00216 71 806469            Tel: 00216 71 806604            Mobile: 00216 98 691 881            E-mail: larbi.naffouti@mt.gov.tn</p>
<p><b>UNITED ARAB EMIRATES</b></p> <p>Mr. Abdullah Fikree</p>	<p>Head Manager Airside Operations            Abu Dhabi - UNITED ARAB EMIRATES            Tel: (971-2) 971 2 50 4510514</p>
<p>Mr. Ahmed Al Jallaf</p>	<p>ATC Supervisor            General Civil Aviation Authority            P.O.Box 6558            Abu Dhabi - UNITED ARAB EMIRATES            Fax: (971-2) 405 4441            Tel: (971-2) 405 4534            Mobile: (971-50) 659 9242            Email: aljallaf@gcaa.ae</p>
<p>Mr. Asim Rizwan</p>	<p>Senior Airport Planner            Abu Dhabi Airport Company            P.O.Box 94449            Abu Dhabi            UNITED ARAB EMIRATES            Fax: (971-2) 509 5059            Tel: (971-2) 509 5022            Mobile: (971-50) 818 9073            Email: arizwan@adac.ae</p>
<p>Mr. Bruce Snowsill</p>	<p>ATS Inspector            General Civil Aviation Authority            Abu Dhabi International Airport            P.O. Box 6558            Abu Dhabi-UNITED ARAB EMIRATES            Fax: (971-2) 405 4406            Tel: (971-2) 405 4381            Mobile: (971-50) 812 2757            Email: bsnowsill@gcaa.ae</p>
<p>Mr. Jim Robinson</p>	<p>Airport Planning Manager            Abu Dhabi Airport Company            P.O. Box 94449            Abu Dhabi - UNITED ARAB EMIRATES            Fax: (971-2) 509 5059            Tel: (971-2) 509 5000            Mobile: 971 50 8117548            E-mail: jrobinson@adac.ae</p>

<b>NAME</b>	<b>TITLE &amp; ADDRESS</b>
Mr. John van Hoogstraten	Senior Air Traffic Controller General Civil Aviation Authority P.O. Box 6558 Abu Dhabi - UNITED ARAB EMIRATES Fax: (971-2) 405 4334 Tel: (971-2) 405 4503 Mobile: (971-50) 445 3951 Email: jhoogstraten@gcaa.ae
Mr. Khalid Al Arif	Senior General Manager Airport Certification and Safety Oversight Dubai International Airport Abu Dhabi - UNITED ARAB EMIRATES Fax: (971-4) 2200888 Tel: (971-1) 42162010 Mobile: 971 5 4520990 E-mail: khlidalarif@dca.gov.ae
Saeed Al Suwaidi	Department of Transport Abu Dhabi - UNITED ARAB EMIRATES Fax: 9712 55757525 Tel.: 9712 5053113 Mobile: 971 504135151 E-mail: Saeed.Alsuwaidi@doti.ae