



DAAD

Civil  Aviation

## **1<sup>st</sup> International Civil Aviation Symposium (ICAS)**

Joint Egyptian German Scientific Symposium

26<sup>th</sup> – 28<sup>th</sup> of November 2013, Cairo

# **Abstracts**







## Preface

### Statement from the Minister of Transport



It is my greatest pleasure to welcome you all to the "First International Civil Aviation Symposium – ICAS" on Investigating Regional Opportunity, Global Sustainability and Innovation in the Aviation Sector" hosted by the German University in Cairo.

Today activities related to culture, society, and economy in our life are closely associated with active interactions with foreign countries. International air transport is necessary for worldwide mobilization of persons and goods. Civil aviation provides an important means of transport, especially to a country as central as Egypt. This makes it necessary to promote the smooth exchange of people and goods in order to stimulate the society and economy and to improve international competitiveness.

The civil aviation industry plays a vital role in both regional and international transport, trading, and tourism. An important issue for civil aviation is to make sure international routes and capacity effectively meet the users' needs. There is a continuous need to further expand the international

aviation network and promote competition based on equitable opportunities.

Development to the overall transport sector in Egypt is crucial. This development should also address the aviation industry and its players in terms of aircrafts, airports, operators, pilots, flights operation, and aviation management. Future trends in aviation should also compromise sustainable development in terms of reduction of the environmental impacts attributed to aircraft operations. The sky agreements and trade zones should be immensely developed.

In the First International Civil Aviation Symposium on Regional Opportunity; innovative solutions related to the aviation sector on the regional scale are presented, paving the road towards sustainable aviation.

We welcome you all to this important event.

**Prof. Dr.-Ing. Ibrahim El-Dimeery**

## **A word from the Symposium Organizer**

The German University in Cairo (GUC) is hosting the 1st International Aviation Symposium (IAS) entitled “Investigating Regional Opportunity, Global Sustainability and Innovation in the Civil Aviation Sector” to enhance the cooperation between German & Egyptian experts in this important field of economic and business development as well as research and policy making.

The event is hosted by the German University in Cairo (GUC) and jointly organized by the Faculty of Management Technology & Faculty of Engineering and Material Science- Civil Engineering Program. The symposium owes special thanks to the German Academic Exchange Service (DAAD) who is the main sponsor of the event.

The symposium focuses on contributions that investigate regional opportunities, sustainability challenges (at the global and local level) and innovative solutions in the aviation sector with a particular focus on Egypt and the MENA region.

Invited speakers include, researchers, policy makers, industry representatives and educators from the aviation industry. The event brings together stakeholders and experts in the field of aviation from Germany, Egypt and beyond. The goal is to provide a platform for intellectual exchange and to foster future research cooperation. Apart from fostering academic exchange and research between the GUC and German institutions, the symposium aims at developing recommendations for Egyptian policy makers with a special emphasis on opportunities and constraints in developing Cairo International Airport into an international aviation hub.

## **Description of thematic focus**

Despite economic crises, terrorism, pandemics and natural disasters the aviation sector has seen an impressive growth in the last decade with the Middle East and North Africa (MENA) among the fastest growing regions in the world. This growth not only heralds new opportunities for the airline industry but for wider regional development and economic growth. Tourism, trade, cargo & logistics hubs and related employment opportunities are but a few examples of regional opportunities that go hand in hand with a flourishing aviation sector.

In Egypt, for example, around 80% of tourist traffic comes through airports with tourism estimated to provide about 2.5 million jobs directly and indirectly (World Bank, 2012). The Dubai aviation model also demonstrates how the aviation sector can become a major driver of economic growth in a region with the entire sector contributing to about 19% of total employment in Dubai and 28% of the Emirate's GDP (Oxford Economics, 2011). At the same time, there are severe regional disparities as not all countries in the MENA region have been equally able to seize growth opportunities through the aviation sector. Amongst others, infrastructure, human capital and regulatory conditions at the national and international levels have been identified as major developmental constraints (AACO, 2011; ICAO, 2011). To address such infrastructural constraints the World Bank has supported in Egypt, for example, the Cairo Airport Development Project.

At the international level, there are continued deregulation initiatives calling for the removal of restrictions from market access, ownership and control. In the MENA region, deregulation initiatives have recently, culminated in the Damascus Convention of 2004 involving a timetable for the implementation of a liberal Arab regulatory framework in air transport. The latter has been connected to calls for a reformulation of Arab-European aviation relations (e.g. EURMED Agreements) with the goal of achieving a balance between the air transport sectors in both regions (AACO, 2011). One aspect of this initiative also involved the severe lobbying against the European Emissions Trading Scheme (ETS), which was not only seen in breach of the Chicago Convention of 1944, but also as a policy that puts



players from developing countries at a competitive disadvantage with adverse growth effects for their home economies.

While the growth and development of the aviation sector involves clear opportunities for different national economies in the MENA region and beyond, it also poses substantial sustainability challenges on a global scale. These involve first and foremost environmental challenges such as noise and emission prevention (CO<sub>2</sub>, NO<sub>x</sub>, Methane, condensation trails, and cirrus clouds). Air traffic, for example, contributes currently to only 2-3 % of global CO<sub>2</sub> emissions, projections are that these will rise to more than 20% by 2050 (Wit, Boon, van Velzen, Cames , Deuber and Lee, 2005; Scheelhaase und Grimme, 2007). Indeed, the need to respond to these challenges has been generally acknowledged. At the same time, global agreements (e.g. Kyoto, ICAO) to curb greenhouse emission largely failed giving rise fragmented and halfhearted solutions, involving for the most part unilateral or regional caps and trade schemes such as the EU ETS, Chinese ETS or South African or the Australian Carbon Tax.

Yet, not only environmental issues related to growth pose sustainability challenges. Growing competition in the sector severely challenges existing business models and labor standards. For instance, while some new players have seized the opportunities offered by market growth and deregulation and developed new successful business models, as in the case of Ryanair or Emirates Airlines, the business models of traditional national flagship carriers have come under increasing pressure for change. For many small players, a stand-alone business strategy has proven unsustainable and for some joining strategic alliances has become the only survival option. However, such memberships may lead to further marginalization and excessive dependence. Importantly, alliances membership may even affect wider regional development as just a few mainly European players dominate global alliances which account for almost 70% of the total share of international air traffic. By the same token, as competition intensifies and becomes increasingly cost based, prevalent employment relations and labor standards come under pressure for change. Plehwe (2012) argues in this context that the increased adoption

of low cost strategies in the airline industry has contributed to a substantial increase in labor conflict across Europe.

On the whole, an ever more pressing question for the industry and its individual players is how to develop innovative solutions that are at the same time environmentally, socially and economically sustainable. For example, low cost and full service carriers alike, are faced with the continuous challenge to develop or leverage innovations that satisfy requirements for reducing their environmental footprint (e.g. better performing airframes and engines, bio-fuel) while improving their performance in the competitive game (e.g. cost reduction through fuel saving). To respond to the above calls, a better understanding of the enabling and constraining conditions for innovation in the aviation sector in general and in airline business models in particular are clearly needed.

## **The contributions**

In line with the symposium's theme, we selected contributions that took a closer look at regional opportunities, sustainability challenges (at the global and local level) and innovative solutions in the aviation sector (kindly refer to abstracts below). Specifically, the contributions compiled for the symposium center on the following themes:

- Regional opportunities through the aviation sector:
  - Role of aviation for economic growth and development
  - Infrastructure and human capital development
  - Regulatory regime change
- Sustainability challenges specific to the aviation sector:
  - Environmental pollution
  - Competitive business models
  - Industrial relations
  - Corporate social responsibility policies and practices
- Innovations in the aviation sector:
  - Business model innovation
  - Service innovations
  - Product and process innovations

We particularly welcomed contributions that represented different regional perspectives (MENA and European). While this primarily involves different scientific perspectives on the topics, we are also very happy to have policy makers, industry representatives and educators present to share their views and insights.

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## **Organizing Committee**

*H.E. Minister of Transport, Prof. Dr.-Ing. Ibrahim El-Dimeery*  
**German University in Cairo**

*Prof. Dr. Florian Becker-Ritterspach*  
**German University in Cairo**

*Associate Prof. Dr. Sherwat Elwan*  
**German University in Cairo**

*Associate Prof. Dr. Sameh A. Kantoush*  
**German University in Cairo**

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### **Opening**

*Prof. Dr. Florian Becker-Ritterspach*

### **Welcome speech by GUC representative**

*Prof. Dr. Ashraf Mansour; Prime founder & BOT chairman of the German University in Cairo*

### **Opening address by conference organizers**

*H.E. Minister of Transport, Prof. Dr.-Ing. Ibrahim El-Dimeery*

### **Welcome Speech**

*H.E.Eng. Abdel Aziz Fadel – Minister of Civil Aviation*

### **Key note speech - Local Advantages and Global Routing in Civil Aviation**

*H.E. Minister of Transport, Prof. Dr.-Ing. Ibrahim El-Dimeery*

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# **Developments in Civil Aviation Affecting Egypt**

## **Local Advantages and Global Routing in Civil Aviation**

*Prof. Dr. Arndt Sorge*

The routing of civil aviation flight connections is a function of: airline strategies and tactics, including alliance and code-sharing strategies and tactics, passenger volume over specific distances, range, size and economic properties of aircraft on supply, and - last but not least – the positioning of airports geographically but also in terms of ease of transfer, customer comfort and non-aviation advantages such as duty-free or other shopping and leisure facilities. To attract traffic and customers, in transfer or for stop-overs as well as to a final destination, airports tend to collude with airlines and governments in order to be attractive stops and destinations. In return, airlines weigh airports, as destinations and stops, interdependent with the business sense of code shares and alliances. This situation is characterized by both, global competition and local advantage construction. Local advantage construction is a largely political matter depending on various actors and interests.

The intensity of competition rests on a combination of global reach or access, with limitations to the concentration of suppliers in the industry. The latter, competition safeguarded by stable deconcentration, is mainly guaranteed by the persistence of Chicago convention principles (government control over landing rights, overflight and cabotage, applied on the basis of negotiated reciprocity between different countries). In this 'glocalization' game, airports follow different strategies in conjunction with governments and airlines. At one extreme end, players operate mainly autonomously (example: Emirates/Dubai). At the other extreme, airports and airlines form alliances with foreign airports and airlines (example: Egyptair in the Star Alliance, combined with an alliance between Fraport and Cairo through share and operational participation).

There is no universal best way of routing and airport positioning in this respect. The economic merit of any arrangement is dependent on the collaboration of actors and the way these select and develop locational advantages. In case that the reader wonders what the 'spooky tooth' is in this story: It is the idea of a universally valid business model and recipe.

## **Role of Civil Engineering in Civil Aviation Sector**

*H.E. Prof. Dr. –Ing. Ibrahim El-Dimeery*

There is a critical need for development in all transportation sectors in Egypt including; road transport, railways, marine transport, as well as aviation. Over the past 10 years, the civil aviation sector in Egypt has experienced major improvements, especially after the infusion of needed funds either from the general funds or through investments from The Egyptian Holding Company for Airports and Air Navigation (EHCAAN).

Egypt's geographical location makes it directly affected by regional & international economic changes and circumstances. Major developments in the existing airports are required to compete regionally and internationally, and to attract civil aviation commercial activities. Continuous progress is also necessary in order to keep pace with major advancements in international civil aviation practices, as Egypt is one of the countries that have to comply with the International Civil Aviation Organization's (ICAO) standards. Civil aviation in Egypt supports the national economy by 2.4% of the National Gross Domestic Product (GDP) and plays a vital role in cargo transport, tourism, and is a key player in linking the development and investment zones together.

Civil engineering activities begin at the early stages of planning and design for Airport location selection where many factors like wind studies and the construction feasibility are considered. In the design stage, civil engineers are responsible to design the main components of an airport which includes; runways, taxiways, aprons, terminal buildings, control towers, and other services within the airport. A well designed transportation network is also needed within the airport, especially for airports with more than one terminal building, and should be properly connected and coordinated with the urban transportation network of the city road and rails. Civil engineers are also responsible for the different maintenance works along the airport operation. The role of Civil engineering in aviation is indispensable and has to work in coordination with other disciplines to offer aviation operation with high standards.

## **EgyptAir's Expansion Plan and Business Modernization**

*Captian Hossam Kamal*



## **Development of Privatized Basic Services in Aviation under Changing Rules – The Case of ANS**

*Dipl. Ing HTL Heinz Wipf*

Privatisation of basic services and liberalisation in general is continuing to be a widely discussed topic for many years. The talk details the interactions between deregulation and privatisation and the economic effects from rules and regulations.

Focus is on public services with safety implications to society. The field of civil aviation and therein air navigation services serve as examples. An interdisciplinary approach touches fields like technology, economy (micro and macro), public law and business administration

## **Impact of Satellite-Based Navigation on Civil Aviation**

*Prof. Moustafa Baraka*

The ongoing modernization of satellite navigation on civil aviation is examined in view of the near completion of the full development of the Global Navigation Satellite System (GNSS). GNSS is introduced through a comparative review of the characteristics of its primary constituents namely; the Global Positioning System (GPS), the Global Navigation Satellite System (GLONASS) and Galileo. The status of the European Geostationary Navigation Overlay Service (EGNOS) is discussed. EGNOS presents an interim stage towards the realization of GNSS. Next, the impact of GNSS on civil aviation is highlighted with emphasis on; the current GPS and EGNOS, the ongoing modernization of GPS, and the expected deployment and development of Galileo. Forthcoming improvements in GNSS and its potential impact on civil aviation are investigated in relation to GNSS accuracy improvement and availability (reliability) characteristics, as well as the anticipated realizations of GNSS integrated navigation (interoperability), improved safety (integrity, liability) and security (anti-jamming, identification, certification) characteristics.

# **Environmental and Sustainability Challenges**

## **The Evolution of Aviation Safety & its Impact on Accident Rates**

*Eng. Mourad Shawky Saadallah*

The objective of this presentation is to provide knowledge of the foundations of aviation safety management concepts according to ICAO Standards and Recommended Practices (SARPs), by discussing contemporary safety concepts.

While the elimination of aviation accidents and/or serious incidents and the achievement of similar absolutes of control would certainly be desirable, such absolutes of control are unachievable goals in open and dynamic operational contexts. Hazards are integral components of aviation operational contexts. Failures and operational errors will occur in aviation, in spite of the best and most accomplished efforts to prevent them. No human activity or human-made system can be guaranteed to be absolutely free from hazards and operational errors.

Safety is therefore a concept that must encompass relatives rather than absolutes, whereby safety risks arising from the consequences of hazards in operational contexts must be acceptable in an inherently safe system. The key issue still resides in control, but in relative rather than absolute control. As long as safety risks and operational errors are kept under a reasonable degree of control, a system – open and dynamic, such as commercial civil aviation – is considered to be safe. In other words, safety risks and operational errors that are controlled to a reasonable degree are acceptable in an inherently safe system.

Safety is increasingly viewed as the outcome of the management of certain organizational processes, which have the objective of keeping the safety risks of the consequences of hazards in operational contexts under organizational control. Thus, for the purposes of this presentation, aviation safety is considered to have the following meaning: *Safety is the state in which the possibility of harm to persons or of property damage is reduced to, and maintained at or below, an acceptable level through a continuing process of hazard identification and safety risk management.*

This presentation reviews the strengths and weaknesses of long-established approaches to aviation safety, and proposes new perspectives and concepts underlying a contemporary approach to aviation safety. The presentation includes the following:

- The concept of aviation safety
- The evolution of aviation safety thinking
- A concept of accident causation – The Reason model
- The organizational accident
- People, operational contexts and safety – The SHEL(L) model
- **Errors and violations**

## **Social and Environmental Sustainability in the Aviation Industry**

*Dr. Alexandra von Winning*

The civil aviation industry is a crucial contributor to economic progress, contributing to prosperity and growth especially in developing countries. On the other hand, it is confronted with ethical controversy, foremost concerning climate change: Aviation is made accountable for 2% of global greenhouse gas emissions, and with aviation emissions having doubled over two decades, the problem is increasing rather than decreasing.

This presentation examines, from the perspective of Economic Ethics, how the aviation industry engages for more sustainability. It analyzes on the basis of numerous examples how companies, civil organizations and politics – faced with serious deficits in the institutional framework for global markets – endeavor to contribute to sustainable development. Both voluntary commitments to social and ecological criteria, for example by improving energy efficiency through technological innovations and optimizing routing and air traffic procedures, as well as legislative approaches such as demonstrated by the European Union by including airlines in its carbon market last year and the most recent advance of ICAO on a roadmap to a decision on a global carbon measure in 2016, are analyzed.

The presentation will be divided into three parts: (1) The first part comprises a theoretical examination of Economic Ethics, a “New Governance” instrument for Corporate Social Responsibility. It analyses the basic capabilities and limits of this instrument. (2) The second part examines how Economic Ethics can be used by the aviation industry in its specific business context. It considers which problems this instrument is appropriate to deal with. (3) The third part assesses empirical findings and draws conclusions regarding current activities of the aviation industry towards environmental sustainability. It considers what lessons have already been successfully learned, and where further learning is needed to make better use of New Governance tools and to apply them effectively to organizing business initiatives for more sustainability.

**Challenges in National Air Navigation Services: The  
example of NANCSC**

*Captain Mohamed Rezk*

## **Does the European Emissions Trading Scheme put MENA Airlines at a competitive advantage?**

*Lubna El Batawy*

Our world is facing a serious problem concerning the environment, namely global warming, which is affected by air pollution. In several industries a number of regulations and procedures have been considered to decrease carbon dioxide in the air. Regarding the airline industry, air transport is playing an important role in people's life as it has changed the way people live and do business, thus facilitating the economic growth and cultural exchange. However, according to the Intergovernmental Panel on Climate Change in 1990 (IPCC) it is stated that aviation causes 2 % of global carbon dioxide emissions and this percentage is expected to be tripled by 2050, for the aviation industry is having an annual growth rate of 4 %.

Hence, the European Union designed an Emission Trading Scheme (ETS) for the air traffic. ETS prices each ton of carbon and caps the amount of CO<sub>2</sub> that can be emitted. Hereby all airlines operating to and from Europe are obliged to participate in the ETS. In light of the rules of the EU ETS, it is argued that the Middle East and North Africa Airlines (MENA Airlines) will have a competitive advantage over their competitors. To investigate this issue, the factors of the ETS scheme should be pointed out that affect airline companies' competitiveness and performance. The position of both MENA airlines and Non-MENA airlines need to be examined and compared with respect to: fleet average age, operating costs, revenues, demand, growth rate of year 2010 and Air Traffic Management (ATM).

The presentation is divided into three parts. Part one describes the scheme of the EU ETS and highlight factors that affect firms' competitiveness and performance. In part two, the above mentioned key factors will be studied and compared each for MENA- and Non-MENA airlines. The conclusion is then drawn in part three by answering the question.



# **Regional Opportunities**

## **How to Earn Money with an Airport?**

*Dip. – Wirtsch. –Inf. Joachim von Winning*

Classical airport income is based on aeronautical fees. Their purpose is to finance airport infrastructure provided by the airport to airlines and their passengers. Classic aeronautical fees are split into take-off/landing fees charging airlines for the use of the runways and passenger and cargo fees for the use of terminals.

Aside of these fees, non-aviation revenues became increasingly important to airports now counting for 44% of total airport revenues worldwide. Non-aviation income consists of concession fees charged to duty free and food & beverage operators, service providers and advertisers as well as income from car parks and real estate rented to companies operating at the airport. Non-aviation activities tend to have significantly higher margins than the traditional airport business.

The historical main reason for the lower margins in Aeronautical is the regulation of fees by the respective authorities. Regulation is justified by the assumption that airports hold at least a local or regional monopoly. Two different methods of setting price caps by regulators were established. The single till approach uses total costs of an airport minus non-aviation revenues to determine the amount that can be charged to airlines plus a regulated profit margin. Dual till separates costs between aviation and non-aviation activities and allows the airport to charge the aviation costs to airlines. Both models and any level of mixed model are used in the European Union today.

Airlines argue that dual till leads to higher regulated prices and that airlines should participate in the non-aviation revenue as they provide the passenger/customer. Airports argue that single till limits entrepreneurial freedom and that there is limited prove of dual till leading to higher fees. An additional argument is that airports – especially in Europe – might be local monopolists but compete for airlines and passengers on a regional and international level.

Depending on the business model of an airline, airport charges account for 5% to 21% of the total cost per seat kilometre offered. In the low fare

market where airport charges have the highest impact on the overall costs a fierce competition between conversion and legacy airports has emerged. In long haul hub traffic, new competitors in Turkey and the Gulf Region entered the market putting tremendous pressure on legacy system partners (i.e. flag carriers and their hub airport such as Lufthansa/Frankfurt).

This competition forces airports to increase the non-aviation revenues irrespective of the regulatory model in order to stabilise or even reduce fees that will be reflected in ticket prices.

One approach that has emerged over the last years is to widen the customer basis of the airport from the passengers, staff, meeters & greeters and visitors to include other consumer groups and businesses. With a widened customer base go additional offers that go beyond the services offered in terminals to include office parks and industrial zones. Airports develop into airport cities leveraging on the unique multimodal traffic infrastructure offered attracting those seeking high connectivity.

## **Regional Opportunities and Pitfalls at Secondary Airports**

*Florian Olischer*

The necessary infrastructure of some products can be politically too sensitive or economically too prohibitive for a single company to bear. In these cases, depending on their involvement, states become stake- or even shareholders. This paper looks into potential shifts of market power between the political and the private sphere by examining the aviation industry.

As a consequence of liberalisation competition among different types of airlines (full-service vs. low-cost) had spread to their major factors of production. Airlines can capitalise on competition arising among airports by using a relatively new although already very powerful instrument: the relocation and/or withdrawal of routes. Evaluating the European airline industry, this paper basically analyses whether a transfer of power away from the political to the private sphere has indeed occurred.

## **Airport Collaborative Decision Making**

*Mohamed Hassan Saber*

## **Balancing International Competition and Home-country Institution; A Case Study of a Low Cost Carrier (Norwegian Air Shuttle)**

*Prof. Dr. Eli Moen*

The paper addresses the question how a low-cost carrier is balancing between industry specific business models and its home-country institutional framework in order to internationalize successfully. It reports the results of a case study of a low-cost carrier (Norwegian Air Shuttle). In 2012 Norwegian was ranked as the third largest low-cost carrier in Europe. In several respects this outcome can be characterized as surprising: 1) commercially, the company is based in country with a small market, 2) institutionally, unlike other low-cost carriers such as Ryanair and EasyJet Norwegian has had to deal with not only one the highest wage levels in the sector, but also a highly regulated labour market and strong unions.

The paper will discuss how home-country high wage levels and strong labour regulation have been overcome by developing firm-specific capabilities. Thus, the paper provides an account of a successful case in a highly competitive international business despite disadvantages linked with home-country institutions. Conclusively, the paper will discuss limits to these capabilities as to further growth and competitiveness.

Methodologically the case study draws on both organizational and institutional theory as to how the international business environment and the national institutional framework continuously impact on its strategies, and in this respect provides an input for further research on industry specific convergence, as well as to theorizing linked with the LME/CME dichotomy within the varieties of capitalism literature.

## **Strategic Challenges for European Network Carriers by Low Cost and Middle East Airlines**

*Mr. Andreas Brynecki*

Network carriers in Europe are increasingly suffering from tough competition arising from Low Cost airlines as well as carriers based in the Middle East region. Until late in the 80's, markets were highly regulated. Policy of liberalization (which already started in the U.S.A. during the 70's) led to dramatic changes in market and competition structures. Today, market shares of Low Cost (or No-Frills) carriers in Europe have achieved a level of more 50%. Moreover, in line with an aggressive fleet extension strategy followed by airlines in the Middle East, hub traffic once handled thru European airports are continuously shifting to the ME-region. The presentation provides a brief insight view of current challenges and potential scenarios going along with these tendencies in global aviation from a European point of view.

# **Infrastructure and Human Capital Development**



## **Evaluation of BOT Airports in Egypt**

*Prof. Dr. Akram Farouk*

*Prof. Dr. Mostafa Refaat*

*Walid El Shamy*

The end of twentieth century witnessed the change of governmental role in infrastructure projects; it changed its role from execution to supervision of infrastructure projects implemented by private sector through different methodologies of privatization in infrastructure projects. Privatization system in infrastructure projects was first initiated in the middle of 1980's. It aimed at improving quality of services provided to users, improvement of economic efficiency of services and reduction of financial burdens on government budget and development of local financial markets. Build Operate Transfer (BOT) system is considered one of the main manifestations of privatization systems as a result of globalization in construction industry. It is accompanied by the increase of private contribution in the infrastructure projects; consequently the role of the government has changed to supervision. Airports facilities are considered one of the most important facilities that privatization system was applied on especially BOT system; because airports are one of the most features that reflect the development of countries. Airports had become one of the main features they compete to show their power and development achievements; in order to introduce better and more entertaining services to customers. Egyptian government offered two airports for private sector participation by BOT model \_Marsa Alam Airport & Al Alamein Airport\_ operated under the supervision of Egyptian government represented in the Egyptian Airport Company (EAC). This paper aims to evaluate Marsa Alam Airport & Al Alamein Airport after around 15 years from construction. It evaluates BOT airports according to their achievement with respect to their primary expectations in the feasibility study stage and implemented achievements during construction and operation phases.

**How Systematic Training Shapes Quality, Service Culture and Image of an Airline. Lufthansa School of Business: Staff Training Sales and Operation**

*Michael Wurche*

## **Reliability Centered Maintenance**

*Eng. Maged Hassan ElMassry*

The main features of the Modern Conventional and Hub Airports facilities are: High Sophistication, Complexity, high capacity and high initial investment cost.

The above features derived the need to adopt a new maintenance concept which can satisfy the objectives for; High Availability and Reduced Maintenance Cost Without compromising; Safety , Security and Facilitations. The Reliability Centered Maintenance (RCM) is a logical structured frame work for determining the optimum mix of applicable and effective maintenance activities needed to sustain operational reliability of system and equipment while ensuring safe and economical operation.

The concept was developed in the Seventies of the Last Century by Civil Aviation industry for Aircraft Maintenance. Due the achieved results in maintenance cost reduction and the increase of Aircraft availability other industries started to explore the potential of applying the RCM maintenance concept. Today the RCM concept is adopted by; Maritime, Power Stations, Trains, Utilities and facilities maintenance.

**Traffic Simulation and Development; A General Model  
Airport Roads in Egypt**

*Saleh Ragab Mousa*

## **Complexity of the Human Factor in Air Traffic Control Operations**

*Eng. Yarah Basyoni*

The civil aviation industry plays a vital role in both regional and international transport, trading, and tourism. Developments in the aviation sector shall include all the parties involved in the aviation industry including; aircrafts; airports; operators; pilots; flights operation and management as well to put forward a consistent developed system.

In the multi-faceted environment of Air Traffic Control (ATC) it is hard to find the major cause of the operation error. The human factor throughout ATC operations is a fundamental one. ATC Specialists' (ATCS) are responsible to separate participating aircraft only from limited information of each flight's track and altitude. The decision-making process of the ATCS is crucial to aviation safety and efficiency. The workload in human operators is a critical element that should be improved for both safety and efficiency measures. Each ATCS is responsible of controlling a finite number of aircrafts depending on the technologies & procedures used at the ATC, and the number of operating aircrafts. Modern computer systems would help controllers and increase their productivities.

The causal role of aircrew errors has received the bulk of the attention by both air safety investigators and human factors researchers to this date. The human error has been cited as a major factor in the majority of aviation accidents and incidents. However, understanding the types of errors ATC personnel make is also important for identifying possible solutions to prevent or mitigate errors. Air traffic complexity is a measure that can identify the underlying factors in the process of decision making undertaken by the ATCS. Aviation communities have been interested in developing measurable metrics for air traffic complexity.

## **Critical Elements of Safety OverSite System**

*Eng. Mostafa Hassan ElGammal*

ICAO Contracting States, in their effort to establish and implement an effective safety oversight system need to consider the critical elements for safety oversight (CE). Critical elements are essentially the safety defense tools of a safety and are required for the effective implementation of safety related policy and associated procedures. ICAO considers essential for a State to establish, implement and maintain the eight critical elements in order to have an effective safety oversight system. The effective implementation of the CE is an indication of a State's capability for safety oversight system. Critical elements of a safety oversight system encompass the whole spectrum of civil aviation activities, including areas such as aerodromes, air traffic control, communications, personnel licensing, flight operations ,airworthiness of aircraft, accident/incident investigation, and transport of dangerous goods by air.

# **Business Models and Innovation in Changing Contexts**

## **Sustainable Customer Service as Success Factor in the Airline Sector**

*Prof. Dr. Anabel Ternès*

A high number of airlines has been switching its business concept from fixed prices for economy or business class to a system of bundles, where customers can choose among a different set of services and book flights to different prices, depending on their individual preferences. This paper aims at finding out which services are those consumers regard as most important and what therefore makes an airline a sustainable choice in terms of service. For that purpose a survey has been conducted for approx. one week, where participants have answered a set of questions online and offline. In the second chapter, the authors will explain certain ground assumptions of online consumers, stressing the importance of user-friendly websites as well as the cost of the most popular extra services offered by regular airlines and also low-cost carriers. Keeping this in mind, the survey's results will be presented in chapter four. 105 participants gave their opinion on what makes an airline's service sustainable to them, the result being a mixture of good cabin crew soft skills, a minimum degree of comfort and efficiency throughout the whole time of purchasing a flight, being on board and leaving the aircraft. A user-friendly booking procedure as well as being able of leaving the airplane fast and receiving its luggage without further waiting has – according to the survey – won over seats in the front row, high-quality menus and entertainment programs. Even the sustainability aspect having been regarded as a factor of high-quality services, is not a major criterion for travelers. What in most cases makes an airline sustainable for passengers is friendly personnel. The bundle systems are preferred, since the cabin crew aspect has not vanished completely in the airline sector, even among low budget airlines. To receive transparency and flexibility when booking a flight, saving money but knowing that a certain quality will almost always be delivered through soft skills on board could be the reason why passengers feel more comfortable with the new business concepts.



## **Evaluation of Business Models in the Aviation Industry; Applying Data Envelop Analysis**

*Prof. Dr. Daniel Schallmo*

In this contribution we describe existing airline business models and evaluate them by applying the data envelop analysis. Therefore we derive critical success factors for airline business models and define inputs and outputs. The inputs and outputs are the basis for the data envelop analysis, which relies on a quantitative data basis and has been applied within several research projects, e.g. the efficiency analysis of healthcare institutions (Nunamaker, 1985) or the analysis of commercial banks (Berg et al., 1993).

Global markets face a dynamic change mainly reflected by saturated markets, higher market transparency, higher competition and lower margins for products and services. The concept of business models helps to understand, structure, compare and develop the own business model. Nevertheless, a structured and quantitative way to evaluate business models within an industry in order to compare them remains an interesting topic. The application of the data envelop analysis has been conducted for several industries but the application within the airline industry is still missing.

The research objective of our contribution is to apply the data envelop analysis in order to evaluate and compare airline business models. Based on the research objective we derive the following research questions:

How can business models be described in a structured way?

Which airline business models exist?

Which critical success factors exist for airline business models?

How can in- and outputs be transferred from the critical success factors?

How can the data envelop analysis be applied in order to evaluate airline business models?

## **Mergers and Acquisitions: an Industry Transition**

*Prof. Dr. Reinhard Bachmann*

## **Modernization of Cairo Fight Information (C-FIR) to Support Aviation Industry**

*Captain Alaa Orabi*

The global economic crisis dramatically affected the air transport industry at global and regional levels. Nevertheless, this economic influence did not last for a long time since decision makers found that this sector would be the savior to push the economy and the world trade through its passenger and air cargo services.

The northern part of Africa as well as the Middle-East are strategic areas for air transport and ATM "Air Traffic Management" where a relevant increase of traffic is expected to take place in the next few years. In this context, a strong development aimed at the joint definition of an ANS/ATM development process, taking into consideration the most relevant Global and European programmes (e.g. ICAO Blocks upgrade, SESAR, the European ATM Master Plan etc.), could add value to the area as well as to the overall Mediterranean basin thus facilitating an economic upswing, with enhanced technological architecture and infrastructures, aligned plans and roadmaps, shared operational concepts.

NANSC "National Air Navigation Services Company" is considered as a reference ANSP "Air Navigation Services Provider" in the African region and a forerunner in carrying forward the implementation of improved operational concepts and related technical enablers.

It becomes necessary to start the third phase of the development of the Air Traffic Services branch including its three main sectors; Air Traffic Management "ATM"; Aeronautical Information Management "AIM"; and the Electronic Engineering.

Since 2002, NANSC took the responsibility, without receiving governmental funds, to improve the level of its services by building the capabilities of its staff followed by improving the operation units in both Air Traffic Management "ATM" and Aeronautical Information Management "AIM" sectors.

In the ATM area, NANSC established a new Air Traffic Control Tower in Cairo Airport to control the traffic that uses its three parallel Runways, a preparation process to upgrade Cairo Airport to be a HUB in the region. Many improvements and renovations have been also made to Sharm ElShaikh, Hurghada, and Luxor Control Towers. In addition, a new one has been established at Borg El Arab Airport.

Besides, Area Control Center ACC expected to be launched in the mid of December 2013 after finishing the third modernization during the last 3 decades. Prior to this modernization processes, major modifications have been made to the Route network to enable Controllers to handle the increase in the air traffic volume particularly after Arab Spring events in neighboring countries.

At the regional level, NANSC with Egyptian Civil Aviation Authority ECAA issued the first version of the Contingency Plan and signed six integrated agreements with the adjacent Flight Information Regions "FIRs". This plan had been submitted to the Middle East Regional office of the International Civil Aviation Organization "ICAO" which acknowledges that Egypt is one two states in the MID which completed this plan.

## **Evolution of Supply Chain Management in Aviation**

*Associate Prof. Sherwat Elwan & Eng. Ziyad Ads*

OEM-dominated supply chains were typical in the aviation industry and were expected to exist for many years. Characterized by the preeminence of buyers over suppliers, where buyers continuously monitor suppliers that are willing to commit to cost reductions and to long-term business relationships.

With the decrease in market demand for aircrafts in the early 1990s a transformation took place leading to a growth in worldwide collaboration, and considerable restructuring processes among the largest airframe manufacturers. This development of globalization led to integration among firms, resulting in a limited number of large groups dealing with the progressively higher technological, financial and market challenges.

Local western suppliers are encountering the risk of being swapped by low-cost country suppliers in the extended and global market place. The choice subcontractors for Western main contractors, or OEMs, are influenced by the increasing political power of customer countries competing for parts of an aircraft.

Disintermediation is acknowledged as one of the main problems facing OEMs. Around 70 percent of engine part manufacturing authorities (PMA) parts are manufactured without an OEM license agreement, and 20 percent of Boeing parts are manufactured without an OEM license agreement.

It was also noticed that recent changes in the OEMs' aftermarket business strategy resulted in many players entering the service sector to capture the service component of aircraft operator maintenance and repair operations (MRO) spending.











## **Organizing Committee**

*H.E. Minister of Transport, Prof. Dr.-Ing. Ibrahim El-Dimeery*  
**German University in Cairo**

*Prof. Dr. Florian Becker-Ritterspach*  
**German University in Cairo**

*Associate Prof. Dr. Sherwat Elwan*  
**German University in Cairo**

*Associate Prof. Dr. Sameh Kantoush*  
**German University in Cairo**