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## ***Air Traffic Management Reform in the U.S., U.K., and Canada***

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Air traffic management reform efforts in Canada, Britain, and the United States had similar roots, but have taken quite distinct restructuring paths. All three countries have been subject to dramatic changes in the airline industry in recent years — especially since 2001. Each air traffic organization was forced to respond in different ways, shaped by the context in which it was formed, the extensive use of debt finance, and the ability (or lack thereof) to manage costs and revenues in a declining environment. The stakeholder model of NAV Canada appeared to be the most flexible in its capacity to respond to industry conditions. The financial structure and regulated industry position of NATS made it more difficult to adjust, but the subsequent restructuring appears to have dealt with many of these problems. Unlike its counterparts, the FAA managed the decline with the least change. While the ability to draw on the government budget in time of crisis was critical to FAA. However, as industry conditions stabilized and growth resumed, both NAV Canada and NATS appear to have more sustainable business models and organizational structures to meet the challenges of air traffic management in coming years.

## ***Aviation Catastrophic Planning and the TSA***

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The implementation of security methods and processes in general has had a decisive impact on the aviation industry. However, efforts to effectively coordinate varied aspects of security protocols between agencies and components, has not been adequately addressed. Overall security issues, especially with regard to planning for a post catastrophic terrorist attack have been neglected. In both conceptual and practical terms, this paper argues for the proactive management of security planning and repeated awareness training from both an individual and organizational systems perspective within the general aviation venue. The results of a research project incorporating survey data from airport managers, airline employees and TSA employees are reported. Survey findings suggest that the interaction between TSA employees and airport management can be contentious and cooperation diminished. The importance of organizational training for decreasing conflict and increasing security and preparedness is discussed as a primary implication.

## ***Commercial Aviation Security: Why People are More Dangerous than Bombs***

Timothy M. Ravich, Hinshaw & Culbertson LLP and University of Miami School of Law

This article examines a critical question for aviation security policy makers, whether it is more important to screen for bad people than for bad things. The backdrop against which this inquiry is presented is a recent, expansive ban by the Transportation Security Administration ("TSA") of carry-on luggage. The TSA imposed a categorical ban of carry-on items on August 10, 2006 after British police announced they thwarted a terrorist plot to explode trans-Atlantic commercial airplanes using liquids undetectable by existing airport screening devices. The ban has since been tweaked to exclude baby formula or breast milk for passengers traveling with infants or small children, prescription medicine matching a passenger's name, and essential nonprescription medicines such as insulin. However, for the foreseeable future, the United States Department of Homeland Security will prohibit air travelers from carrying liquids, gels or lotions onboard an aircraft. These restrictions are disturbing both because they aggravate already inconvenient airport security processes and because they reflect reactionary policy made to a threat of which the government was aware before the fact. These restrictions also highlight why national aviation security policy myopically focused on bombs and metal objects instead of people is backward-looking and flawed, "the equivalent of fighting the last war."

Airline passenger profiling systems, whether by computer or behavioral observation, are a vital layer of commercial aviation security. Such systems are as necessary today as they were on September 11th, 2001 ("September 11th") when 19 terrorists hijacked at least four commercial airplanes to destroy the World Trade Center Twin Towers in New York City, the Pentagon in Washington, D.C., and either the White House or the Capitol Building. Presently the federal government is developing airline passenger profiling systems for the purpose of pre-empting terrorists with September-11th-like intentions. Specifically, the TSA has developed and is developing computerized profiling systems such as "CAPPS II," "Secure Flight," and the "Registered Traveler Program." These anti-terrorism devices are appropriate measures to manage the risk against future airline terrorism, be it of the magnitude of September 11th or otherwise.

This article does not accept the federal government's ongoing development of profiling systems uncritically. There are important constitutional and practical

considerations that cannot and should not be dismissed simply because more security is needed at the nation's airports. Principle among these considerations are liberty and privacy.

This article aims to present both sides of the ongoing debate respecting airline passenger profiling.

***Container Terminal Seaside Operations Scheduling: Does Current Research Address the Practical Challenges of Berth Planning? - A Critical Review***

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Container terminals are open systems of material flow with two external interfaces: the quayside for loading and unloading of the ships and the landside where containers are loaded either to trucks or trains. Three systems can be differentiated: the landside, the seaside and the container handling/storage system, all of which interact with each other, while each of these systems can be further broken down into subsystems.

The seaside system consists of the ship berthing operations (berth planning and quay crane scheduling), and the loading and unloading of containers onto the ship. This paper focuses on the first component of the seaside system, the berth planning. A few published papers have focused on reviewing marine terminal operations, including berth planning related literature within that context. These review papers, however, do not exclusively and extensively cover the berth planning literature.

This paper presents a comparative and analytical, up-to-date, review of existing research efforts relating to berth planning. Existing models have been critically reviewed based on their a) efficiency in addressing key operational and tactical questions relating to vessel service, and b) relevance and applicability to different berth planning marine terminal operator strategies and contractual service arrangements between terminal operators and shipping lines. Strengths and deficiencies of the existing models to address real world problems in a systematic and coherent manner are being discussed. The paper concludes with a critical overview of issues to be addressed to make these models more relevant to real world applications.

## ***Culture and Aviation***

James Szeredy

This paper examines culture and how it effects aviation and aviation related activities around the world. Culture is an essential part of society and the community and plays a key role in the interactions of people and affects our daily lives. The U.S. Government supports developing nations with aviation training and those trainers need to understand other cultures. Additionally, thousands of people fly around the world yearly and are affected in their flights and destinations by culture. This paper will look into the various ways culture is intertwined within aviation and an aviation subculture.

***Innovation and Sustainability: Assessing the Impact of the Small Community Air Service Development Grant Program***

Scott E. Tarry, University of Nebraska at Omaha

In 2002, the U.S. Department of Transportation initiated the Small Community Air Service Development (SCASD) program to fund the development and implementation of innovative strategies to help small communities address their concerns about commercial air service. While the program has been altered somewhat since the first year, the essence of the program remains the same. Grants ranging up to a million or more dollars are given to communities or consortia of communities who believe that the commercial airline industry is not providing the quantity or quality of service they deserve. Problems with small community airline service are not new. In fact, many of the complaints and concerns voiced today are reminiscent of those raised as far back as the 1950s. SCASD has been touted by its proponents and recipients of its funds as a necessary step to resolve the problems associated with small community air transport. The program's emphasis on customized and innovative approaches to air service development has been touted publicly. This paper reviews the history of small community air service to show that the problems remain the same. Moreover, the analysis shows funded projects have failed to provide any genuinely innovative approaches, and that funds are being used to implement strategies that are, for the most part, unsustainable.



## ***Machine Learning in Modeling Expressway Winter Maintenance Performance***

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This paper presents a machine learning approach to modeling the performance of winter maintenance operations on Western New York's expressways. A second objective is to identify any discrepancy in performances between expressway segments which are directly linked but maintained by two different agencies, namely the New York Department of Transportation and the New York Thruway Authority. The study uses speed reduction converted from actual travel time on the two agencies' connected expressway segments as the index of level of service. The traffic data is obtained from a traffic surveillance system based on automatic vehicle identification technology, while the meteorological data is provided by the National Weather Service weather surveillance radar system. First, multiple regression analysis is conducted to model hourly speed reduction during snow storms over an entire winter season. However, non-linear relationships are found to exist in the model. Therefore, the M5 machine learning algorithm is applied to induce a model tree, at each leaf of which is a linear regression model for a particular input space. The result shows that there is an evident gap in the level of service between the two agencies only during the early stage of storm events. Implications for the seamless operations of the regional expressway system are discussed.

***Measuring the Performance of Transport Logistics Corridors in Developing Countries: The FastPath Approach***

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Paul Kent, Nathan Associates, Inc.

This paper will present a newly developed approach to measuring the performance of transport/logistics systems in developing countries. It includes both a process and an analytic software system. The process includes a rapid assessment audit and the software tracks price, time and reliability in specific corridors. The paper will present the results of applications of the approach in the ASEAN region and in India and Bangladesh.

***Model Analysis and Computer Simulation Study for Feeders of the High-Speed Package Sorter***

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In this paper, the working process of package feeders in high-speed package sorter is discussed. By applying appropriate simplifications, feeder mathematic model is created. Then by doing the simulation and analysis, it is discovered that a sorter should companion with multi feeders; and that buffer-stage should be equipped to selected feeders according to the position of each along the carrier's moving path. The research provides a scientific method for devising package feeder configuration afterwards.

Key Words: package sorter; package feeder; package feeder model; simulation

## ***Modeling Empty Container Matching Opportunities through a Virtual Container Yard***

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Empty container drayage trips are considered to be a major problem for port metropolitan areas, adding to traffic congestion, increased emissions and inefficient equipment interchange.

A Virtual Container Yard (VCY) is an Internet based information sharing platform, aiming at permitting empty container interchange and other processes to take place without moving the container back to the marine terminal or an empty container depot.

Using a VCY system as a platform for sharing and providing information among the different port players (ocean carriers, trucking operators etc.) to make freight logistics more efficient by means of street-turns (direct empty container moves from a consignee to the next consignor) is increasingly considered as a viable solution to reduce empty Vehicle Miles Traveled (VMT) and associated congestion and emissions.

This paper describes a modeling approach and a simulation model that captures the process of matching empty containers and the essential features of implementing a VCY. The anticipated benefits from VCY implementation, in terms of VMT reduction and the economic conditions for the successful operation of the system are quantified. The results for different scenarios of input parameters, system environments and practical constraints, in order to make the system feasible, are presented and analyzed. The paper concludes with recommendations to achieve favorable conditions for practical implementation of the system.

***Operating, Financial and Total Leverage Present to the U.S. National Air Carriers Since 1990***

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In a prior study just published in the *Journal of the Transportation Research Forum*, the authors examined the extent of operating, financial and total leverage facing the major U.S airlines, those carriers with total revenues of \$1.0 billion or more. The study found that the vast major of the carriers were highly leveraged at both the operating and financial levels and that this resulted in highly unstable profitability and increased the dangers of bankruptcy. The current study seeks to examine a sample of the next level of carriers-those with revenues less than \$1.0 billion.

The U.S. airline industry has always been highly cyclical and somewhat fixed cost driven. The carriers are thus high in what financial analysts refer to as operating leverage. In addition, the many airlines have followed aggressive debt strategies; that is, they have chosen to use large amounts of long-term debt finance to purchase assets. This results in a high degree of financial leverage. In the past, the resulting combined leverage has created severe financial problems for the major carriers. The purpose of this paper is to examining the effects of this leverage on the next level of carriers. In doing so, comparisons will be made to the large carriers. If possible, the authors will use the same time horizon as in the published paper, although in some cases carriers are too new to have such a long history.

***Overriding Trends in Cross-Border Regulations and Programs Impacting the Security, Safety and Efficiency of Freight Movements***

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Dave Frank, Bureau of ITS and Freight Security

Alicja Gados, Bureau of ITS and Freight Security

The tragic events of 9/11 have resulted in an accelerated, substantive increase in cross-border regulations, programs and the application of technology to address security concerns. The border, and beyond, specifically the entire route of the supply chain, has been targeted as the area where security threats can be intercepted. This focus has allowed the creation of a few key trends that are prevalent in new regulations, especially post 9/11.

For the three regulatory areas identified, safety, security and trade/economic, we argue that security programs have clearly eclipsed both trade/economic issues and safety as drivers of change at the border. The new environment requires stakeholders to take responsibility of security through monitoring of their supply chains and trading partners: thereby creating the other major trends of pushing out of borders and increased private sector accountability. These trends show the government realizes that border security does not end at the physical border, but includes in fact the entire supply chain. The use of EDI is another very important trend taking place. By reducing paper, customs can do so much more with information that it receives from transactions, and can manipulate and analyze it more efficiently. Automated manifests are a high-profile topic for freight security, as they are being made mandatory across modes.

Regulations, programs, infrastructure and communication are increasingly become bilateral. This is a relatively new trend in countries developing similar-focused programs across borders because there is a general recognition that combined, common approach have the greatest positive impact on the secure and efficient movement of international goods.

***Private Sector Benefits of Adopting FAST: The Canada - U.S. Transport Market***

Garland Chow, University of British Columbia

Supply chain security is a concern of both the public and private sector. While public authorities may encourage and in many instances require compliance to certain process standards to improve supply chain security, the private sector has to implement and in most situations, make an investment in time, resources and capital. This paper examines the factors that have led to the slow adoption of FAST certification in the U.S. - Canada cross border transportation market. Issues include un-recognized collateral benefits, vertical collaboration in the supply chain, and free loader strategy. Field studies and simulation are used to support the findings.

## ***SAFETEA-LU Earmarks in Minnesota: Urban-to-Rural Arbitrage?***

Michael Smart, University of California - Los Angeles

This paper explores the spatial distribution of earmarked transportation projects in Minnesota in the SAFETEA-LU transportation legislation. It is shown that earmarks are disproportionately found in rural areas and it is hypothesized that this disproportionate distribution is the result of arbitrage, whereby rural transportation projects "pay" with more votes to their congressional representatives than do urban projects. It is theorized that urban projects attract far more opponents than do rural projects. Support for this argument is drawn from hedonic models showing consumers' preference for living near to transportation facilities, but their aversion to living immediately adjacent to these facilities. The result of this arrangement is the over-emphasis of rural transportation improvements, which may have far-reaching impacts on land use and urban development.



***Stochastic Benefit Framework: A Framework and an Application in Air Transportation***

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Estimation of future benefits from federal programs designed to improve air transportation infrastructure using deterministic or point forecasts could be misleading in presence of uncertainty. Uncertainty rooted in airlines decisions, for example, make the forecasts at the airports very difficult, especially in the short run. In this paper and presentation, we offer a framework where demand uncertainties can be incorporated in benefit estimation. We illustrate this framework by using an FAA investment program. The findings of the paper may have significant impact on future financing of air transportation infrastructure investment, including that of next generation air transportation system (NGATS).

## ***The Temporal-Fares-Offered Curves in Air Transportation***

Kenneth Button, George Mason University

Henry Vega, George Mason University

The deregulation of aviation from the late 1970s in the US and the 1990s in Europe has led to the ability of airlines to price discriminate when selling their seats. There is now almost a universal use of dynamic third degree price discrimination — "yield management" — by airlines with markets being segmented by their different fare elasticities with respect to when seats are booked. The increasing use of Internet booking facilities provides analysts with a rich data source of the profile of fares that are offered for a particular service as the time a departure approaches — "temporal-fares-offered curves." This paper offers a critical assessment of this form of analysis. It also reviews the empirical work that has been done using this type of data and to bring together the information and insights that it can throw on the operations of an airline market. The subjects covered range from strategies of low-cost and legacy carriers when there are different degrees of competition, the extent to which there is price leadership in markets, and the ways in which airlines determine fares-offered when their schedules mean that their own services effectively compete with each other.

***Using Simulation Modeling to Quantify the Benefits of Replacing Traditional Truck Weigh Stations with Weigh-In-Motion***

David Frank, BITSAFS, Sauder School of Business, UBC

Teresa Jiang, BITSAFS, Sauder School of Business, UBC

The replacement of weigh stations with new weigh-in-motion (WIM) installations is a growing trend throughout North America. This technology can also play an increased role in the efficiency, safety and security of freight movements. However, given the multiple demands on road infrastructure projects, it is often difficult to obtain approval for WIM installations. Cost-benefit analysis can assist in determining the priority of WIM projects over competing needs, but quantifying the benefits of these installations can be problematic. This paper presents detailed process maps of WIM and builds a simulation model of those processes. Using this model, the benefits of WIM to both industry and the weigh station operator, under various scenarios, are quantified. Case studies and field work are used to support the findings.