Key Findings: 2013 ATRS Global Airport Performance Benchmarking Project

Tae Hoon Oum
Yap Yin Choo
Chunyan Yu
Embry-Riddle Aeronautical University, yuc@erau.edu

Follow this and additional works at: https://commons.erau.edu/publication

Part of the Business Administration, Management, and Operations Commons, Finance and Financial Management Commons, and the International Business Commons

Scholarly Commons Citation

This Presentation without Video is brought to you for free and open access by Scholarly Commons. It has been accepted for inclusion in Publications by an authorized administrator of Scholarly Commons. For more information, please contact commons@erau.edu.
2013 ATRS Global Airport Performance Benchmarking Project

Key Findings
Prof. Tae Hoon Oum, Dr. Yap Yin Choo, Prof. Chunyan Yu

ATRS Global Airport Benchmarking Task Force:
Asia Pacific: P. Forsyth, Xiaowen Fu, Yeong-Heok Lee, Yuichiro Yoshida, Japhet Law, Shinya Hanaoka
Europe: Nicole Adler, Jaap de Wit, Hans-Martin Niemeier, Eric Pels
North America: Tae Oum, Bijan Vasigh, Jia Yan, Chunyan Yu
Middle East: Paul Hooper
OBJECTIVE OF THE BENCHMARKING STUDY

- To provide a comprehensive, unbiased comparison of airport performance focusing on:
  - Productivity and Operating/Mgt Efficiency
  - Unit Cost Competitiveness
  - Airport User Charges

- Our study does not treat service quality differentials across airports because of our research resource constraints.
2013 ATRS Global Airport Performance Benchmarking Project

Airport Database
195 MAJOR AIRPORTS AROUND THE WORLD

- N. America, 77
- Asia Pacific, 51
- Europe, 67
- Oceania Countries (16)
- Asia (35)
- United States (65)
- Canada (12)

12 new airports
26 AIRPORT GROUPS

Asia Pacific (9) vs. Europe (17)

1 new

Objective | Data | Airport Characteristics | Methodology | Efficiency & Cost | User Charge
The ATRS Database contains historic information (since FY 2002) including financial data, traffic and capacity data for the major airports and airport groups in the following geographic regions:

- Asia Pacific including Oceania; Europe; North America
- Limited data on S. America and Africa

The data in each continent is segregated into:

- Traffic statistics and composition
- Airport characteristics (runways, terminals, ownership form, etc)
- Aeronautical Activities and Revenue
- Non-Aeronautical Activities and Revenue
- Labor input and other Operating Expenses
- Financial info obtained from Balance Sheets

Visit [http://www.atrsworld.org/Database.html](http://www.atrsworld.org/Database.html) for more details and to purchase.
2013 ATRS Global Airport Performance Benchmarking Project

Airport Characteristics
PASSENGERS TRAFFIC, FY2011
(IN ’000 PASSENGERS)
PASSENGER TRAFFIC (’000) -
TOP 10 AIRPORTS:
AIRCRAFT MOVEMENTS, FY 2010
(’000 ATM)
PASSENGERS PER AIRCRAFT MOVEMENTS, FY 2011
AIR CARGO TRAFFIC, FY 2010
(’000 METRIC TONS)
% NON-AERO REVENUE, FY 2011

As shown in the graph, the non-aeronautical revenue distribution for FY 2011 is as follows:

- **Asia Pacific**: Approximately 70% non-aeronautical revenue.
- **Europe**: Approximately 60% non-aeronautical revenue.
- **North America**: Approximately 50% non-aeronautical revenue.

The red line represents the average non-aeronautical revenue percentage for the year.
2013 ATRS Global Airport Performance Benchmarking Project

Methodology
AIRPORT PRODUCTIVITY INDEX

**Outputs**
- Aircraft movement
- Passenger
- {Cargo tonnes}
- Non-aeronautical revenue output

**Inputs**
- Labour
- Other non-capital (soft-cost) input
- [Runways, terminal size, # of gates]
METHODOLOGY: EFFICIENCY MEASUREMENT

- Variable Factor Productivity (VFP) Index
  - Impossible - Total Factor Productivity (TFP) because of capital input cost accounting problem (comparable across different countries)

- Unit Operating Cost Competitiveness Index:
  Combines VFP and Input Price Index
MULTILATERAL AGGREGATION METHOD

• This **multilateral output (input)** index procedure uses the following revenue (cost) shares to aggregate output (inputs)

\[
\ln \frac{Y_i}{Y_j} = \sum \frac{R_{ki} + \overline{R}_k}{2} \ln \frac{Y_{ki}}{\overline{Y}_k} - \sum \frac{R_{kj} + \overline{R}_k}{2} \ln \frac{Y_{kj}}{\overline{Y}_k}
\]

\[
\ln \frac{X_i}{X_j} = \sum \frac{W_{ki} + \overline{W}_k}{2} \ln \frac{X_{ki}}{\overline{X}_k} - \sum \frac{W_{kj} + \overline{W}_k}{2} \ln \frac{X_{kj}}{\overline{X}_k}
\]
**GROSS** VARIABLE FACTOR PRODUCTIVITY (VFP)

NORTH AMERICA LARGE AIRPORTS

(YVR=1.0), FY 2011
POTENTIAL REASONS FOR THE MEASURED PRODUCTIVITY (GROSS VFP) DIFFERENTIALS

Factors Beyond Managerial Control:

- Airport size (Scale of aggregate output)
- Average aircraft size using the airport
- Share of international traffic
- Share of air cargo traffic
- Extent of capacity shortage - congestion delay
- Connecting/transfer ratio

We compute residual (Net) Variable Factor Productivity (RVFP) after removing effects of these Factors.
GROSS VARIABLE FACTOR PRODUCTIVITY VS RESIDUAL VFP: NORTH AMERICA (YVR=1.0), FY 2011
We explored Alternative approaches:

- Data Envelopment Analysis (DEA)
- Econometric Cost Function Approach including Stochastic Frontier methods (SFA)

The rankings for **top and bottom ranked airports** are consistent despite using VFP, DEA or SFA.

Note: Industry acceptance of our report using more advanced/sophisticated methods is one of our major concern.
RESIDUAL RANKING COMPARISON OF TOP 15 AIRPORTS IN US

Rank

ATL  RDU  RNO  CLT  PBI  BNA  MSP  JAX  LGA  SAT  TPA  SNA  MCO  MKE  FLL

Residual VFP Ranking  Residual DEA Ranking  Residual SFA Ranking

Objective  Data  Airport Characteristics  Methodology  Efficiency & Cost  User Charge
RESIDUAL RANKING COMPARISON OF BOTTOM 15 AIRPORTS IN US

© Air Transport Research Society (ATRS) 24
RESIDUAL RANKING COMPARISON OF MID-RANKED 15 AIRPORTS IN US

Objective Data

Methodology Efficiency & Cost

Residual VFP Ranking
Residual DEA Ranking
Residual SFA Ranking
2013 ATRS Airport Benchmarking

Key Results on Efficiency & Cost
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): ASIA (HKG=1.0), FY 2011

Gimpo, Incheon, Guam

Objective | Data | Airport Characteristics | Methodology | Efficiency & Cost | User Charge
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): OCEANIA (SYD=1.0), FY 2011

Objective | Data | Airport Characteristics | Methodology | Efficiency & Cost | User Charge
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP):
EUROPE LARGE AIRPORTS (CPH=1.0), FY 2011

Copenhagen Kastrup, Athens, Zurich

Airport Groups

Objective > Data > Airport Characteristics > Methodology > Efficiency & Cost > User Charge
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP):
EUROPE SMALL & MEDIUM AIRPORTS (CPH=1.0), FY 2011

Geneva, Basel, Nice

Objective Data Airport Characteristics Methodology Efficiency & Cost User Charge
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP):
NORTH AMERICA LARGE AIRPORTS (YVR=1.0), FY 2011

Atlanta, Minneapolis St. Paul, Charlotte

Objective Data Airport Characteristics Methodology Efficiency & Cost User Charge
RESIDUAL (NET) VARIABLE FACTOR PRODUCTIVITY (VFP): N. AMERICA SMALL & MEDIUM AIRPORTS (YVR=1.0), FY 2011
TOP EFFICIENCY PERFORMERS (2013)
(based on Net VFP index=operating/management efficiency)

Asia Pacific:
- **Asian Airports:**
  - Gimpo, Incheon, Guam
- **Oceania Airports:**
  - Sydney, Auckland, Townsville

Europe:
- **Large Airports (> 15 million pax):**
  - Copenhagen Kastrup, Athens, Zurich
- **Small/Medium Airports (< 15 millions Pax):**
  - Geneva, Basel, Nice
TOP EFFICIENCY PERFORMERS (2013)
(based on Net VFP index=operating/management efficiency)

North America:

• Large Airports (> 15 million pax):
  • {Atlanta (Globally Most Efficient Airport)}
  • Minneapolis St Paul, Charlotte, Tampa

• Small/Medium Airports (< 15 millions Pax):
  • Oklahoma City, Richmond, Raleigh-Durham

Global (10th Global Excellence Award)

• Hartsfield-Jackson Atlanta International Airport
COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT
ASIA (HKG=0.0) – THE HIGHER THE BETTER

Haikou, Seoul Gimpo, Airport Authority of India
COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT
OCEANIA (SYD=0.0)

Queensland Airport Limited (QAL),
Auckland, Dunedin (NZ)
COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT

EUROPE - LARGE AIRPORTS (CPH=0.0)

Athens, Lisbon, ANA (Aeroportos de Portugal)
COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT
EUROPE - SMALL & MEDIUM AIRPORTS (CPH=0.0)

Ljubljana (Slovenia), Basel, Tallinn (Estonia)
COST COMPETITIVENESS = NET VFP AND INPUT PRICE EFFECT
N. AMERICA - LARGE AIRPORTS (YVR=0.0)
COST COMPETITIVENESS: = NET VFP AND INPUT PRICE EFFECT N. AMERICA - SMALL & MEDIUM AIRPORTS (YVR=0.0)

Oklahoma City, Richmond (Virginia), Raleigh-Durham

Objective | Data | Airport Characteristics | Methodology | Efficiency & Cost | User Charge
2013 ATRS Airport Benchmarking

User Charge Comparison
LANDING CHARGES
FOR BOEING 767-400, 2012 (IN US$)

Objective
Data
Airport Characteristics
Methodology
Efficiency & Cost
User Charge
ASIA PACIFIC: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 767, 2012 (IN US$)

Lowest charges: **Taipei Taoyuan**, Dunedin (New Zealand)

Highest charges: **Osaka Kansai**, Tokyo Narita

- Combined Landing and Passenger Charges for Boeing 767
- Mean
EUROPE: COMBINED LANDING AND PASSENGER CHARGES FOR BOEING 767, 2012 (IN US$)

Lowest charges: **Riga** (Latvia), Luxembourg

Highest charges: **London Heathrow**, Ben Gurion (Tel Aviv)
NORTH AMERICA: COST PER ENPLANED PASSENGER, 2011 (IN US$)

Canada:
Lowest CPE: Victoria, Regina
Highest CPE: Toronto, Montreal

United States:
Lowest CPE: Charlotte, California Bob Hope (Burbank,CA)
Highest CPE: New York JFK, Newark Liberty
The ATRS Global Airport Performance Benchmarking Report: 3 volumes, over 600 pages of valuable data and analysis.

Can be purchased by visiting www.atrsworld.org

Report sale finances our annual benchmarking research project
ACKNOWLEDGEMENT OF APPRECIATION

Gold Corporate Members

- Houston Airport System
- Hartsfield-Jackson Atlanta International Airport

Corporate Members

- Vancouver Airport Authority
- Gatwick Airport Ltd
- Copenhagen International Airport
- Istanbul Sabiha Gockcen International Airport
- Korea Airports Corporation
- Kazan international airport, Russia
- German Aerospace Center
- Airbus
- Boeing
Thank You

2014 ATRS World Conference
(Bordeaux, France, July 17-20, 2014)