AIRPORT SURFACE ACCESS POLICIES TO REDUCE CO₂ EMISSION: A REVIEW

Caterina Malandri, Luca Mantecchini, Filippo Paganelli, Federico Rupi
Outline

- Introduction:
  - Air transport impacts and airport ground access target and expected performances

- Theory:
  - Planning for accessibility
  - Relevant contributors to pollution at airports → airport carbon footprint

- Market-based mitigation measures
- Technology-based mitigation measures
- Infrastructure-based measures
- Scope-oriented classification
- Concluding remarks
Since the «jet age», the fuel burnt and CO$_2$ per single event have been drastically reduced. However, aircraft manufacturers expect an average growth of traffic in the next future, which will make the issue of pollution worse, notwithstanding research on technology, ATM and alternative fuels. Aviation is responsible for 2% of total anthropogenic CO$_2$ emissions, 5% of which is attributable to airports.

Sources: IATA / AIRBUS
Accessibility to airport directly affects airport operations and its financial performances:

- it’s a parameter evaluated by airlines deciding whether to start servicing a specific airport
- passengers who miss their flight due to delays during access trip won’t choose the airport once again

**RELIABLE, ROBUST AND ATTRACTIVE GROUND ACCESS ALTERNATIVES**
The concept of accessibility can have a double definition:

- **ECONOMIC**: opportunity possessed by an individual to take part in a target activity or set of activities at a given location and time under certain travel time, distance or generalized cost conditions with the possibility to draw a certain benefit.

- **TRANSPORT**: extent to which land-use and transport system enable groups of individuals to reach activities or destinations by means of a combination of transport modes.

### ACCESSIBILITY INDICATORS

1. Infrastructure-based (level of service, average speed, congestion ... )
2. Activity-based (n° jobs within a target distance/travel time ... )
3. Person-based (quality perceived, passenger experience ...)
4. Utility-based (4 stages model)

**Fundamental principles of established transport planning theory**

- Travel is a derived activity which is undertaken due to the value associated to the destination
- People seek to minimize the total travel cost

**Key challenges**

- Planning for accessibility rather than for demand accomplishment
- Perception of leisure time as a way to escape from the declining quality of life
- Replace trips with at home activities thanks to technology
- Apparent conflict between “speeding things up” for business and “slowing things down” for safety and environmental reasons → desirable level of congestion
- Reliability of travel time is more crucial than its minimization

Airport ground access

Congestion and environmental externalities
(atmospheric pollution, localised noise...)

Development of reliable, robust and attractive transit systems accessing the airport

→ Shift toward more sustainable transport modes

Growing political pressure to reduce private car use:

To be an attractive option, transport system should meet consumer needs and preferences.

Relevant factors associated with airport ground access mode choice:

- Journey time
- Distance
- Ease of baggage handling
- Trip purpose
- Travel time reliability

References: Tam et al. (2005), Jou et al. (2011), Koster et al. (2011)
Airport carbon footprint

Airport infrastructures, assets and commuting/accessing traffic contribute to **AIRPORT CARBON FOOTPRINT**

Polluting sources are classified into **direct** and **indirect**

**REFERENCES:** Postorino & Mantecchini (2014), Postorino, Mantecchini & Paganelli (2016)
Airport carbon footprint

AENA aeropuertos cooperated with El-Prat local transport authority in identifying weak points within airport accessibility and in the introduction of a Mobility Plan to encourage modal change.

- Both for passengers and employees
- Reduce n° of single occupancy vehicles and congestion
- Preferential car parking granted (LTN, LHR)

Employees face additional problems since they need to access the airport at non-peak periods (i.e. night-shifters)
- Car is usually the only modal choice available
- Raising awareness on other transport modes and driving public transport design might promote behavioural change (BLQ, CDG, BCN)

Promotion of car sharing

Market based actions

- Mobility plans for travellers
- Mobility plans for employees

INTRODUCTION  THEORY  MARKET-BASED  TECHNOLOGY-BASED  INFRASTRUCTURE-BASED  CLASSIFICATION

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Market based actions

Car-parking fee is modulated w.r. to distance from terminal, n° of free slots, vehicle’s emission rate (Stockholm). Otherwise, for electric vehicles the fee is lower and includes free charging.

- Agreement between airport management and local transport authority
- The airport pays its workers a relevant % of the public transport tickets or gives them extra money if uses public transport.

Tolls & fee modulated on vehicle’s emission

- In Italy taxis are perceived as a luxury service and there is strong lobbyism
- Quick turn-around of the fleets
- Give priority to drivers with higher rates and eco-friendly vehicles
- In Stockholm the % of eco-taxi grew from 0% to 100% in less than 7yrs

Job tickets

Eco-taxi
Technology based actions

- **ITS** identify the optimal route with real-time information, connections and integrated reservation system.
- Quite common in the north EU

- Taxi management system – lifago app
- Users can hire a taxi everywhere (i.e. other than a taxi spot) minimizing empty rides
- Virtual taximeter and route track
- Possibility to review the drivers

**Integration of journey planner & reservation**

- Inform passengers with tailored campaign to promote alternative transport + network of info points at key locations
- Periodic surveys on awareness of environmental impacts of airports
- Exchange of best practices
- Leaflets with travel info for each transport alternative

**Inform passengers and employees**

**Technology based actions**

**Taxi app**
Infrastructure based actions

- The solution is/has being implemented at many airports to boost the existing service capacity: Stockholm, Prague, Mazovia, Paris, Bologna, Rome, Bari ...

- Passengers can drop off the bags the evening before departure in the city centre and go to the airport with public transport the next day

- Dedicated bus lanes to increase performance
- Express bus services linking airport terminals and city centre with eco vehicles designed for shipping airport passengers
- On-demand bus → flexible routes and service schedule for both passengers and employees

- Many airports deciding to extend or favoring the connection to bike paths
- Realistic transport solution for employees
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Classification

Airport Surface Access Policies to Reduce CO₂ Emissions: a Review

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INTRODUCTION THEORY MARKET-BASED TECHNOLOGY-BASED INFRASTRUCTURE-BASED CLASSIFICATION

Market-based, technology-based and infrastructure-based actions usually differ greatly as far as capitals to be invested and time horizon of implementation are concerned.

Measures can pertain to one or more than one group; when more than one group is involved both potential effectiveness and wariness in the implementation phase are higher.

**For example, measures 1-2 need intervention on airports’ ground access, but also promotional campaign to support the adoption of the policies and in the earliest phase a careful assessment (i.e. CBA)**
Conclusions

- Measures to reduce polluting impacts from ground access at airports are needed, since the impact of additional demand will soon overtake benefits from technology and capacity improvements.
- All these measures are not imposed by regulators/authorities, but are adopted on voluntary basis by apt management.
- Policies aiming at artificially steering demand are not always successful without commitment by key stakeholders and high awareness of the audience → EU projects involving airports, transport authorities, universities and local authorities can create a supportive framework for implementation.
- Further research can include time horizon needed prior becoming effective and CBA into the classification.
- The degree of effectiveness of a measure is linked to airport typology (location), traffic typology served and distance from city centre → relevant knowledge of features and needs.
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THANK YOU!

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