Developing key performance indicators for airports

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Short version

- We develop a set KPI's, which can be used for monitoring the performance of airport operations
- The airport is divided into different activity areas, and Airport KPI's are developed for each of them
  - two or three indicators are selected for each area based on previous research
- A questionnaire based survey study is performed
  - Airport managers in Sweden and Spain
  - Ranking of the initially selected indicators
- A final set of indicators are selected

Key performance indicators

- *KPIs represent a set of measures focusing on those aspects of organizational performance that are the most critical for the current and future success of the organization (Parmenter, 2007)*
- Used to measure the most important aspects of the airport
- May have different structure and units
  - Sometimes do not say anything by themselves
  - Compare to historical data or to equivalent measures for other airports

KPI's for airports - motivation

- Airport owner: ”How are we doing?”
- Manager: ”Fine, fine….”

Previous work

- There has been some previous work where Airport KPI's are developed, e.g.:
  - Francis et al. (2002)
  - Humphreys & Francis (2002)
  - Oum & Yu (2004)
  - Gillen & Lall (1997)
  - Enoma & Allen (2007)
- Based on their work, an initial set of KPI's is developed

Airport activity areas

- Operations
  - Physical movements and flows
- Economy
  - Costs, income, profit
- Environmental issues
  - Noise, energy consumption, emissions, etc
- Safety and Security
  - Preventions and handling of accidents and threats
- Customer service
  - Passenger satisfaction

Initial selection of KPI's

Activity Area	KPI's	Activity Area	KPI's
Airport Operations	1.Turnaround times in the apron/gate area 2.Arrival Inbound efficiency 3.Departure Outbound efficiency 4.Temporal distribution of demand by time-of-day 5.Total traffic in terms of aircraft movements 6.Runway occupancy times by type of aircraft 7.Taxiing times from runways to apron/gates and vice-versa 8.Baggage delivery time 9.Number of runways and taxiways simultaneously in use	**Airport Environ-mental Issues**	1.Energy consumption 2.Number of contamination events 3.Waste recycling (tons) 4.Area affected by aircraft noise 5.Number of breaches of noise limits 6.Share of journeys that use public transport
		Airport Safety and Security	1.Number of aircraft safety incidents 2.Number of incidents at security checkpoints 3.Time between shut-down and reopening in case of security breach 4.Time it takes to business operations to begin in case of evacuation 5.Taken time and grade of destruction when returning to normality
Airport Economy	1.Income per passenger 2.Traffic income per passenger 3.Non-aeronautical income per passenger 4.Staff cost per passenger 5.Revenue per expenditure ratio 6.Commercial income per square meter of floorspace 7.Expenditure per passenger 8.Contribution per WLU	**Airport Customer Service**	1.Check-in waiting and processing times 2.Security control waiting and processing times 3.Amount and duration of delays 4.Quality of signage/ease to find the way 5.Baggage waiting time.

Questionnaire based survey

- Airport managers in Sweden and Spain ranked the KPI's in the initial set
- Survey sent to 45 Swedish and 45 Spanish airport
  - Valid answers from eight Swedish and four Spanish airports

Rankning of KPI's

Activity Area	KPI's	Activity Area	KPI's
Airport Operations	1.Turnaround times in the apron/gate area 2.Arrival Inbound efficiency 3.Departure Outbound efficiency 4.Temporal distribution of demand by time-of-day 5.Total traffic in terms of aircraft movements 6.Runway occupancy times by type of aircraft 7.Taxiing times from runways to apron/gates and vice-versa 8.Baggage delivery time 9.Number of runways and taxiways simultaneously in use	**Airport Environ-mental Issues**	1.Energy consumption 2.Number of contamination events 3.Waste recycling (tons) 4.Area affected by aircraft noise 5.Number of breaches of noise limits 6.Share of journeys that use public transport
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Comments from airport managers

- Ranking will vary between small and large airports
- Indicators should be related to volume
  - Income per employee
  - Energy consumption per passenger
  - Incidents per movement
- KPI's measuring delays should also include information about the cause
- Since airports vary in terms of finance, production models, etc, it is very difficult to draw any conclusions from a general set (but good luck)

Final selection of KPI's

- The set should span the whole airport
- The use of the indicators must be intuitive and they must be easy to understand
- There should be a small number of indicators, for it to be possible to monitor information rapidly

Final set of KPI's

Activity Area	KPI's	Activity Area	KPI's
Airport Operations	**Turnaround times in the apron/gate area:** average T/A times **Arrival Inbound efficiency:** arrival delay caused by airport **Departure Outbound efficiency:** departure delays caused by airport	**Airport Environmental Issues**	**Energy consumption:** used for benchmarks and to analyze trends **Number of contamination events:** e.g. leakage of de-icing fluid
		Airport Safety and Security	**Number of aircraft safety incidents:** should be traced to cause **Number of incidents at security checkpoints:** have to be compered against security enhancements
Airport Economy	**Income per passenger:** total annual income / pax **Traffic income per passenger:** income for aeronautical activity / pax	**Airport Customer Service**	**Check-in waiting and processing times:** important level of service parameters **Security control waiting and processing times:** should be in line with airport ambitions

Conclusions

- We have developed a manageable set of indicators that can be used to monitor the airport and quickly get information when some process or area fails to live up to the desired standard
  - Comparison with other airports (benchmarking)
  - Analyzing the development of the airport over time
- Have not yet been tested operationally
- Selection based on a predefined set
  - Respondents could suggest their on KPI's
- Next step: implement and test for at least two airports