



## Indicator Information Sheet

Subject:	Air Transport Development
Kind of indicator:	Performance Indicator
Spatial objective:	Worldwide
Object:	Trends at Airports
Theme:	<b>Airport Traffic Performance</b>

### 1. Purpose of the indicator category

The purpose of the indicator field of “Airport Traffic Performance” is to give an overview on the development of general airport traffic in terms of the number of movements and passengers as well as the amount of freight handled at global airports.

The chosen set of indicators represents in this context a useful measure to estimate the needed capacity at airports and to gain information in order to provide the necessary infrastructure for handling future demand and avoiding capacity lacks in parallel. With this approach, the given indicators can contribute to an increase of the effectiveness of existing airport infrastructure. Furthermore, the indicators serve the purpose to report the size of airports in terms of passenger numbers, movements and freight amount for the present and past and regard the overall airport development as a whole. This allows also gaining an insight in the general air traffic development on the global level.

### 2. Description of the indicator development

As already mentioned above, the chosen indicators illustrate the airport traffic performance in terms of passenger numbers, the number of movements, as well as the amount of freight/cargo handled at global airports from a long-term perspective. This is done for a large set of airports with data chosen from ACI<sup>1</sup>.

Additionally, also a smaller set of global airports – the top 30 airports worldwide in terms of traffic figures – are regarded. This smaller set of airports also represents an important starting point for analysis, as traffic handled at the top 30 airports is considerably higher than traffic handled at an average airport. Therefore, this extract from the extended set of airports already allows drawing conclusions on the situation of the whole airport system and the overall demand for air services. The development at the top 30 airports represents a good early warning indicator, as trends which can be identified on this level reflect significantly the situation of the air transport system and especially the demand side of the underlying market due to the high share of total airports in regard to movements and flights. The top 30 airports include all airports participating in the ACI annual traffic statistics collection.

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<sup>1</sup> As a rather small amount of airports is responsible for a high amount of total aircraft movements, it is not reasonable to take all airports into consideration when calculating the indicators, since the high amount of minor airports may distort the message of the indicator. As every year the indicator should include the same airports, the benchmark year is 2006: Every airport that had more than 10,000 aircraft movements becomes part of the indicator, provided that data is available for each year. The airports that meet this criteria in 2006 sum up to 703 for the years 2006-2013. As numbers have changed, the previous indicator sheet can only partly be compared to previous indicator sheets.



Taking into account these considerations, the following indicators for measuring the airport traffic performance were chosen and are described in the following:

1. The average number of movements per airport
2. The average number of movements per top 30 airport
3. The average number of passengers per airport
4. The average number of passengers per top 30 airport
5. The average amount of freight per airport
6. The average amount of cargo per top 30 airport

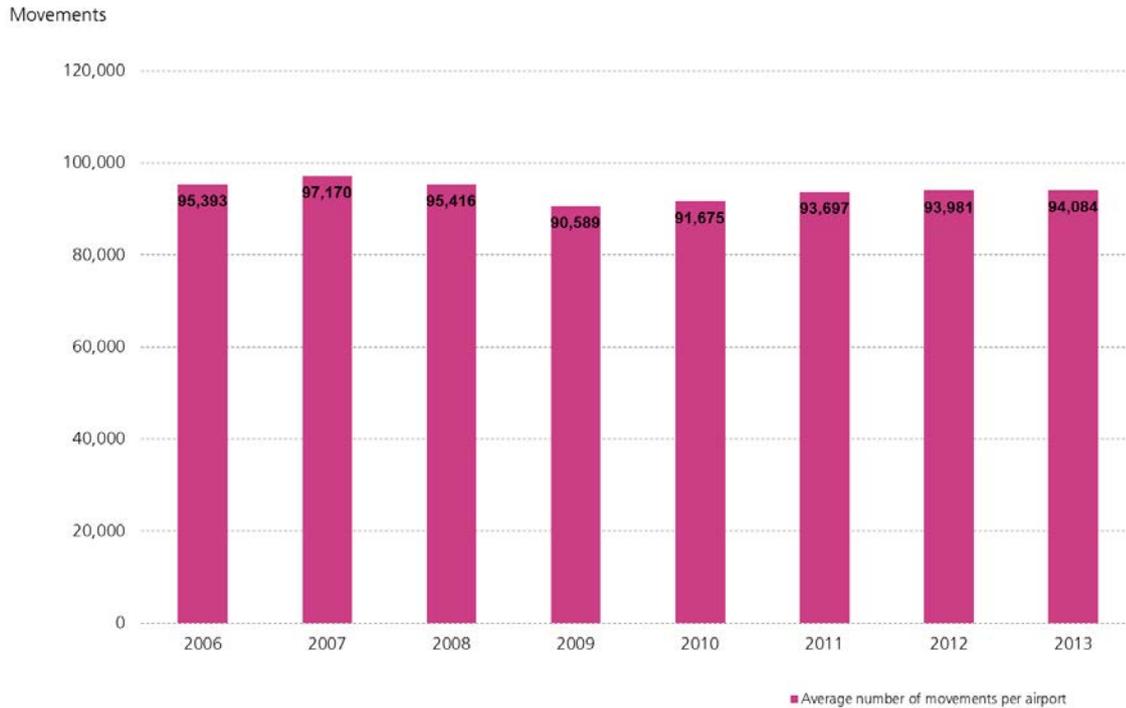
Together, all indicators allow to gain a good overview on the airport traffic performance as a whole and to draw conclusions on the past and current air transport demand. Linkages to framework developments and trends in air transport external fields can furthermore be observed.

It can for all six indicators be concluded that they illustrate the latest developments in the air transport sector from an airport perspective very well. Furthermore, the demand side of the air transport market is additionally analyzed by showing developments with regard to the number of movements, passengers and the amount of freight handled. The overall downward trend in the year 2009 with regard to all investigated figures make the presented observations very plausible as the concerned figures indicate corresponding trend curves.



## Indicator 1: Average number of movements per airport

Source: DLR, own calculations based on ACI.



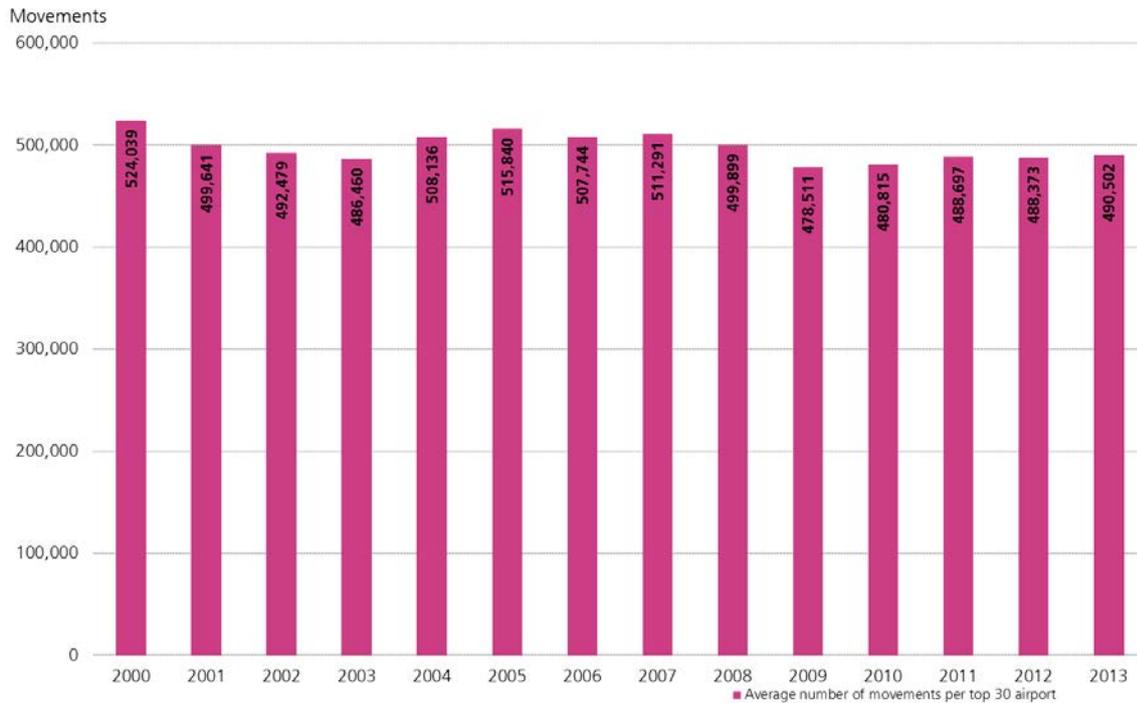
The figure above shows the short-term development of aircraft movements for a set of the 726 global airports that have more than 10,000 movements per year. Movement as it is understood here means the landing and take-off of an aircraft at an airport. Movements cover all passenger and combi (passenger and freight) aircraft as well as general aviation and other aircraft movements.

Looking at the graph it can be seen that the average number of movements has dropped over the last few years with more than 97,000 movements in 2007 down to around 91,000 movements in 2009. One reason for this clear downward trend can obviously be seen in the economic crisis which affected the air transport demand situation since 2007 and resulted in a short-term interruption of the previous growth of the aviation sector. Since 2009, numbers are increasing again. With an average of 94,084 movements per airport in 2013 figures are still under the average value from the historical peak in 2007.

## Indicator 2: Average number of movements per top 30 airport



Source: DLR, own calculations based on ACI.



The figure above shows the mid-term development of the average number of movements per top 30 airport. The graph shows slight fluctuations in aircraft movements and, just like the average number of movements per airport shown in the chart above (Indicator 1), the number of movements decreases in the periods from 2000 to 2003 and from 2005 to 2009 except for the year 2007. In 2007, the number of movements per top 30 airport increases appropriate to the number of movements per average airport so that a similar development over the last few years can be observed. Since 2009 the numbers slightly increased again but are nearly stable since 2001. With 490,502 movements per year in 2013 the number of movements is shortly over the average of 498,030 movements in the period of 2000 to 2013.

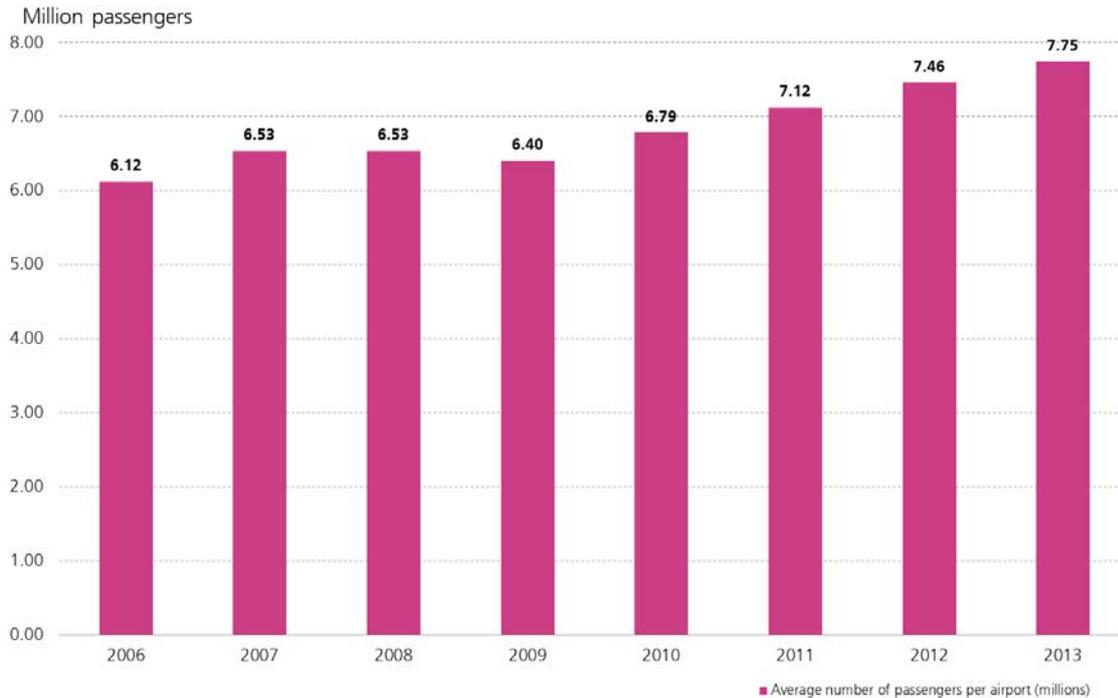
In general, a significant difference between the average airport and the top 30 airports can be seen in the number of movements, as it is between eight and nine times larger for the top 30 airports. Even the biggest 20 airports on global scale show a similar relation as they are responsible for handling about 11% of all aircraft movements worldwide. In Europe, this share is even larger, meaning that Europe's top 20 airports cover 38% of all European aircraft movements.<sup>2</sup>

<sup>2</sup> cf. DLR, Analyses of the European air transport market (2008), p. 126.



### Indicator 3: Average number of passengers per airport

Source: DLR, own calculations based on ACI.



The chart shown above describes the short-term development of the average number of passengers<sup>3</sup> per airport (based on the 703 airports with more than 10,000 movements). It can be seen that after an increase of passengers from 2006 to 2008, although only for around 410,000 passengers in 2008, passenger numbers are significantly declining again in 2009 to 6.4 million passengers per average airport. In comparison to Indicator 1 it is remarkable that in 2008 the number of movements is already declining while the number of passengers still shows a slight increase. Since 2010 average passenger numbers per airport are increasing again (similar to Indicator 1) which results in 2013 with 7.75 million passengers per airport. With this growth tendency the 2013 value is clearly above the all-time average of 6.84 million passengers and shows a kind of stable tendency compared to the overall development of aircraft movements (cf. Indicator 1).

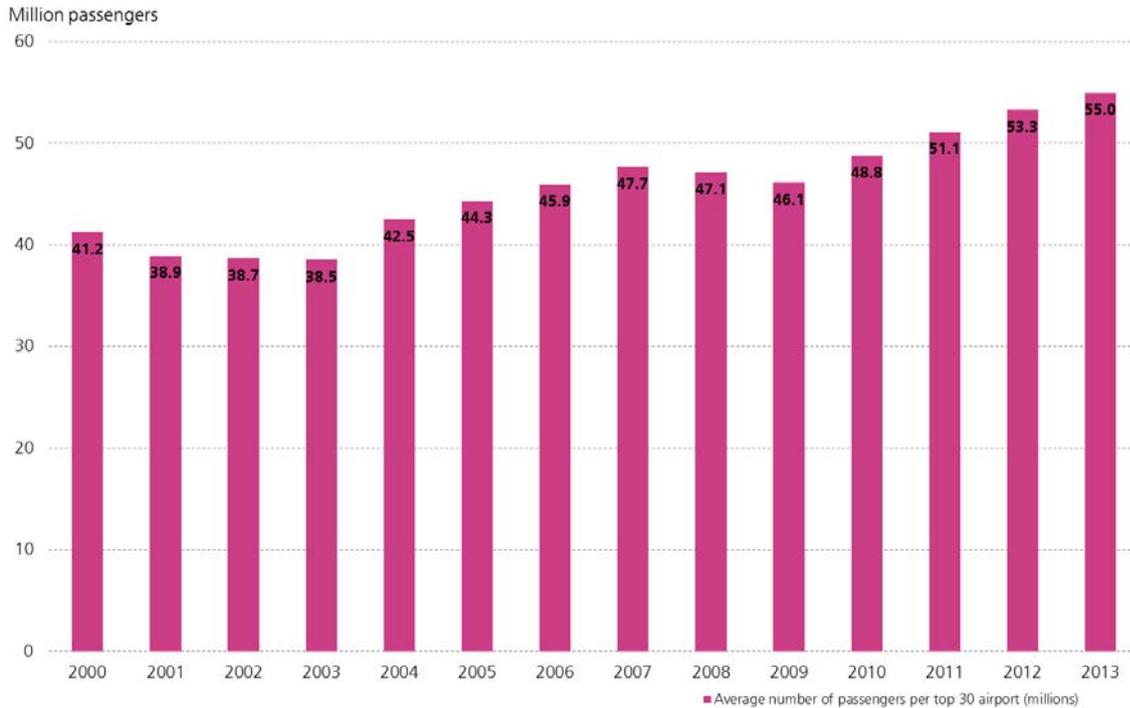
Given the overall development shown in the graph, it is very likely that the effects of the economic crisis and the resulting fallen demand in the air transport sector are responsible for the decrease of passenger figures in the year 2009. The presented indicator therefore marks the high sensitivity of the air transport market with regard to framework developments. Changes in the overall economy directly affect the demand for air transport services and mostly in a very fast manner.

<sup>3</sup> Passengers cover international and domestic commercial passengers (enplaned and deplaned) as well as direct transit passengers, which are only being counted once. Slight distortions of the numbers through double-counting of transfer passengers have to be kept in mind.



## Indicator 4: Average number of passengers per top 30 airport

Source: DLR, own calculations based on ACI.



The average number of passengers per top 30 airport is illustrated in the chart above. Looking at the graph, the number of passengers decreased from 2000 until 2003, followed by a steady increase in passenger numbers until 2007 up to nearly 48 million passengers. This underlines the well-known high growth the air transport sector reported up to 2007 before the economic crisis started. Passenger numbers declined between 2007 and 2009 due to falling demand before numbers are strongly increasing again since 2009, resulting in an all-time high of 55 million passengers in 2013. One reason for this short-break decline could be that many people became more price-sensitive as a result of worse economic conditions. The decrease in passenger figures between 2007 and 2009 is stronger at the top 30 airports (-3.4% between 2007 and 2009) as it is at the average airport (-2% for the same period). The airports regarded in the top 30 case are mainly big hub airports with many transit and business passengers which are more or less dependent on the hub function of the regarded airports and on travelling in general. Nevertheless, it has to be regarded, that numbers can not be compared directly as the average of all airports is based on a stable number of 703 airports whereas the Top 320 airports may vary from year to year.

Anyhow, despite this difference in trends, the top 30 airports represent also in case of passengers a good indicator for observing the situation of the air transport market. When comparing the average number of passengers per average airport and per top 30 airport, it can be seen that this figure is significantly higher at a top 30 airport than at an average airport, namely between seven and eight times higher. Even in case only the top 20 airports of the world are regarded, they still contribute to a performance of handling 22% of all passengers worldwide.<sup>4</sup>

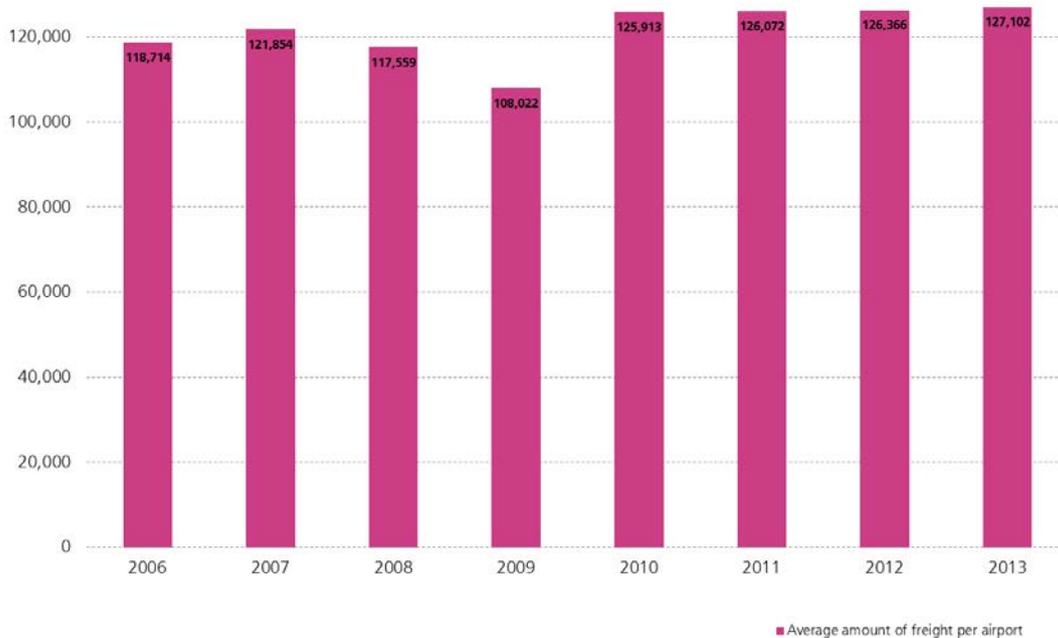
<sup>4</sup> cf. DLR, Analyses of the European air transport market (2008), p. 121.



## Indicator 5: Average amount of freight per airport

Source: DLR, own calculations based on ACI.

Metric tonnes



The chart illustrates the short-term development of the average amount of freight<sup>5</sup> given in metric tons per airports with more than 10,000 movements per year (a total number of 703 airports is regarded in this chart similar to Indicator 1 and 3). Since 2007, a consistent decline, starting with an average around 121,854 metric tons in 2007 and resulting in only 108,022 metric tons in 2009, can be observed over the three-year period.

In search of an explanation for this development, the economic crisis starting in 2007/2008 can again be seen as one reason for the shrinking air freight market in the regarded short time period. Already the past has proven that especially the demand for logistics and transport services is determined by a highly volatile market which reacts very fast and strongly on changing economic conditions. This is clearly reflected in the indicator given above.

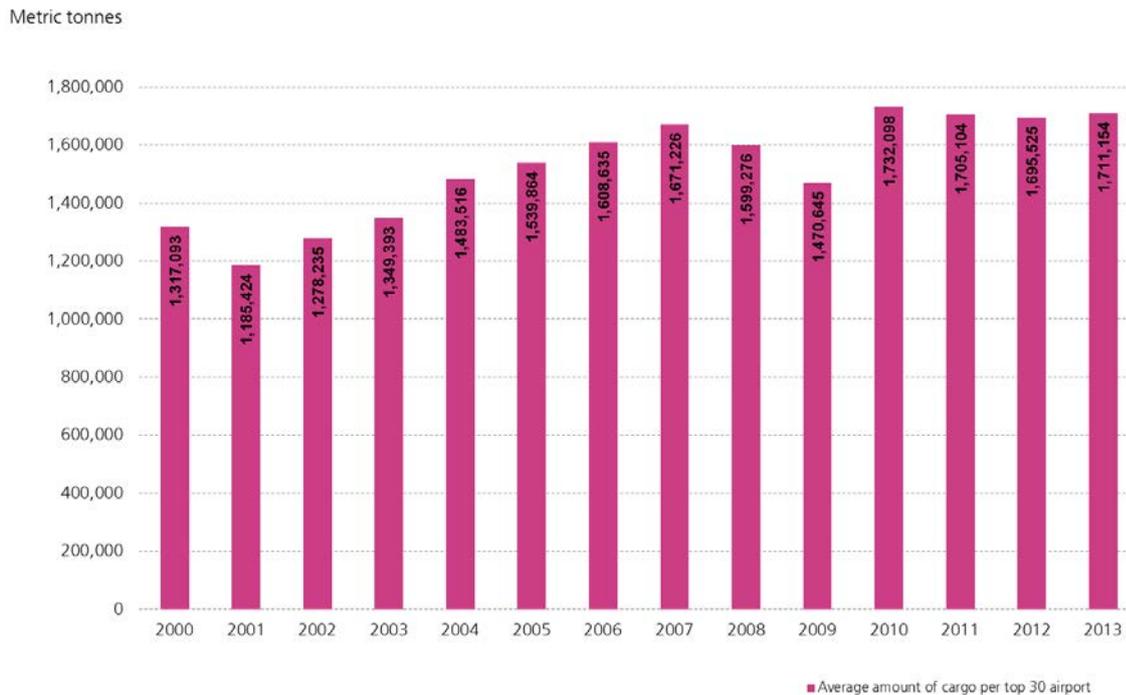
Since 2010 a strong increase of freight amount can be seen which again was slightly topped by each of the following years, so that since 2010 numbers are significantly above the all-time average of 121,450 metric tons per airport and year.

<sup>5</sup> Freight in the given context means international and domestic commercial freight (loaded and unloaded) as well as total international and domestic mail (loaded and unloaded). The amount of freight is given in metric tons.



## Indicator 6: Average amount of cargo per top 30 airport

Source: DLR, own calculations based on ACI.



The graph above shows the mid-term development of the average amount of cargo per top 30 airport given in metric tonnes. The source includes all airports participating in the ACI annual traffic statistics collection. Apart from the decline in the average amount of freight in 2001, a steady increase in the following years is shown in the chart, resulting in a maximum of 1.67 million metric tonnes in 2007. Afterwards a decrease down to 1.47 million metric tons can be noticed whereas for 2010 increasing numbers are recorded. In contrast to the average of the extended airport set in Indicator the freight amount of 2011 and 2012 slightly decreased for the top 30 airports which is among other reasons a result of the growth of especially Asian airports listed in the Top 100 but not in the top 30<sup>6</sup>. For 2013, numbers are, however, slightly increasing again.

The reduction of about 8% from 2008 to 2009 has again to be analyzed with regard to the economic crisis. As it is the nature of the freight business, the high volatility of the corresponding market in dependence from the health of the overall global economy becomes clearly visible here. Air freight customers can react faster and more flexibly (due to alternatives in shipping) to changing economic circumstances what makes the reduction of 8% less air freight per top 30 airport after the economic downturn plausible. The reduction of passenger numbers at the same set of top 30 airports (-3.4%) is much less dramatically.

With regard to the significance of the indicator given above it can again be mentioned that this has to be ranked very high. The average amount of cargo per top 30 airport is about ten times higher than for an average airport and represents a very good early warning indicator for ongoing trends and challenges with regard to the demand development in the whole air transport sector.

<sup>6</sup> <http://evaint.com/our-publications/cargo-airports-and-services/previous-issues/cargo-airports-services-october-2012/very-cyclical-business>, 12.02.2013



### 3. Main sources of the discussed indicators

- ACI: World Airport Traffic Report (Years 2006-2012) ([Metadata description](#))
- ACI: Annual Traffic Data: World airports ranking by total aircraft movements
- ACI: Annual Traffic Data: World airports ranking by total passengers
- ACI: Annual Traffic Data: Ranking by total cargo

### 4. Alternative sources to build similar indicators in the given indicator field

- ICAO: Database “Airport – Traffic” ([Metadata description](#))

### 5. References

- DLR (2008): Analyses of the European air transport market ([Metadata description](#))

**Indicator 1: Average number of movements per airport**

Year	Number of total aircraft movements	Number of airports	Average number of movements per airport
2006	67,061,081	703	95,393
2007	68,310,330	703	97,170
2008	67,077,508	703	95,416
2009	63,683,823	703	90,589
2010	64,447,386	703	91,675
2011	65,869,256	703	93,697
2012	66,068,944	703	93,981
<b>2013</b>	<b>66,140,837</b>	<b>703</b>	94,084
<b>Average</b>	<b>66,082,396</b>	<b>703</b>	<b>94,001</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The aircraft movements cover Passenger and Combi Aircraft, All Cargo Aircraft and General Aviation and Other Aircraft Movements

There are differences in the numbers, when comparing the WATR data of the different years.

The newly collected WATR data of one year do not exactly match the previous year data one year later, since some airports report their numbers late. However, these deviations are so small, that one can neglect this fact. Therefore, the data in the table above are always based on the most recent WATR report.

**Indicator 2: Average number of movements per top 30 airport**

Year	Number of total movements at the top 30 airports	Average number of movements per top 30 airport
2000	15,721,158	524,039
2001	14,989,235	499,641
2002	14,774,358	492,479
2003	14,593,812	486,460
2004	15,244,065	508,136
2005	15,475,211	515,840
2006	15,232,314	507,744
2007	15,338,726	511,291
2008	14,996,975	499,899
2009	14,355,336	478,511
2010	14,424,441	480,815
2011	14,660,938	488,697
2012	14,651,186	488,373
<b>2013</b>	<b>14,715,056</b>	<b>490,502</b>
<b>Average</b>	<b>14,940,915</b>	<b>498,030</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The source includes all airports participating in the ACI annual traffic statistics collection. Movement means landing + take off of an aircraft.

**Indicator 3: Average number of passengers per airport**

Year	Number of total passengers	Number of airports	Average number of passengers per airport (millions)
2006	4,304,072,876	703	6.12
2007	4,593,281,859	703	6.53
2008	4,593,421,883	703	6.53
2009	4,501,413,453	703	6.40
2010	4,770,498,510	703	6.79
2011	5,006,094,786	703	7.12
2012	5,243,262,818	703	7.46
<b>2013</b>	<b>5,445,562,579</b>	<b>703</b>	<b>7.75</b>
<b>Average</b>	<b>4,807,201,095</b>	<b>703</b>	<b>6.84</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The number of passengers covers commercial passengers (international enplaned + deplaned), commercial passengers (domestic enplaned + deplaned) and direct transit passengers (counted once). There are differences in the numbers, when comparing the WATR data of the different years. The newly collected WATR data of one year do not exactly match the previous year data one year later, since some airports report their numbers late. However, these deviations are so small, that one can neglect this fact. Therefore, the data in the table above are always based on the most recent WATR report.

**Indicator 4: Average number of passengers per top 30 airport**

Year	Number of total passengers at the top 30 airports	Average number of passengers per top 30 airport (millions)
2000	1,237,353,727	41.25
2001	1,167,379,254	38.91
2002	1,159,861,037	38.66
2003	1,155,794,297	38.53
2004	1,275,605,209	42.52
2005	1,330,119,621	44.34
2006	1,377,764,886	45.93
2007	1,430,086,038	47.67
2008	1,413,917,481	47.13
2009	1,384,167,081	46.14
2010	1,463,162,783	48.77
2011	1,533,308,710	51.11
2012	1,598,662,821	53.29
<b>2013</b>	<b>1,648,772,512</b>	<b>54.96</b>
<b>Average</b>	<b>1,369,711,104</b>	<b>45.66</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The source includes all airports participating in the ACI annual traffic statistics collection. Total Passengers means total passengers enplaned and deplaned. Passengers in transit are counted once.

**Indicator 5: Average amount of freight per airport**

Year	Total cargo (metric tonnes)	Number of airports	Average amount of freight per airport
2006	83,456,257	703	118,714
2007	85,663,211	703	121,854
2008	82,644,208	703	117,559
2009	75,939,223	703	108,022
2010	88,516,899	703	125,913
2011	88,628,546	703	126,072
2012	88,835,044	703	126,366
<b>2013</b>	<b>89,352,653</b>	<b>703</b>	<b>127,102</b>
<b>Average</b>	<b>85,379,505</b>	<b>703</b>	<b>121,450</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The total commercial cargo is given in metric tonnes. The figures include commercial freight (International loaded + unloaded), commercial freight (Domestic loaded + unloaded) and Total Mail (International and Domestic loaded + unloaded).

There are differences in the numbers, when comparing the WATR data of the different years. The newly collected WATR data of one year do not exactly match the previous year data one year later, since some airports report their numbers late. However, these deviations are so small, that one can neglect this fact. Therefore, the data in the table above are always based on the most recent WATR report.

**Indicator 6: Average amount of cargo per top 30 airport**

Year	Total cargo (metric tonnes) at the top 30 airports	Average amount of cargo per top 30 airport
2000	39,512,792	1,317,093
2001	35,562,727	1,185,424
2002	38,347,036	1,278,235
2003	40,481,784	1,349,393
2004	44,505,471	1,483,516
2005	46,195,932	1,539,864
2006	48,259,052	1,608,635
2007	50,136,794	1,671,226
2008	47,978,275	1,599,276
2009	44,119,363	1,470,645
2010	51,962,933	1,732,098
2011	51,153,114	1,705,104
2012	50,865,764	1,695,525
<b>2013</b>	<b>51,334,620</b>	<b>1,711,154</b>
<b>Average</b>	<b>45,743,976</b>	<b>1,524,799</b>

Source: ACI: World Airport Traffic Report Excel (Years 2006-2013)

Proposal for the chart: bar chart; cf. "Analyses of the European air transport market 2008", page 74 as example for the chart

**Remarks:**

The source includes all airports participating in the ACI monthly traffic statistics collection. Total cargo means loaded + unloaded freight + mail in metric tonnes.

\*Anchorage (ANC) includes transit freight.

*This Indicator Information Sheet was prepared by the MONITOR project partners DLR – Institute of Air Transport and Airport Research and the Center for Aviation Competence (University of St. Gallen)*

*Date of release: Jan, 29 2015*



**MONITOR**

Monitoring System of the development of Global Aviation  
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<http://www.airtransport-monitor.eu>, German Aerospace Center (DLR) – 29.01.02.2015, errors and omissions  
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