The case of Rotterdam The Hague Airport

Noise has always been the main concern of airports. Several operational measures such as night curfew and/or flight quota have been introduced at airports to reduce noise. Noise produced by aircraft may be perceived as an annoyance by the community living nearby the airport. However, to airports, it means revenues flowing in for their business. Therefore, the value of noise can be viewed differently by different recipients.

TEXT Wan Mazlina Wan Mohamed, PhD Researcher, Air Transport & Operations, Faculty of Aerospace Engineering

AIRPORT NOISE
Airports need airlines to fly to and from their airports to generate business, and airports generate economic benefits to the communities, but aircraft produce externalities. The externalities generated from commercial flights have various impacts on air quality, noise, water quality, fuel and energy consumption, waste and the ecology. Among these externalities, noise issues have always been the biggest environmental concern and challenge for airports, because noise is the most obvious issue that can be identified immediately by the communities that live within the airport’s vicinity.

A common response to noise complaints in the past denied that noise generates cost, and focused instead on progress and economic benefits derived from more intensive use of airport resources. But noise is costly and complaints from the communities can delay or obstruct airport growth. If noise restriction is managed efficiently, it could assist sustainable growth for airports and provide a better environment for the community. We will take a look at Rotterdam The Hague Airport’s operational measures in reducing noise and their impact on the Rotterdam airport’s revenues and community complaints to understand the value of noise.

ROTTERDAM THE HAGUE AIRPORT SPECIFICS
Rotterdam The Hague Airport (formerly known as Rotterdam Airport or Zeistlshaven), is located north of Rotterdam city and is situated in a highly dense catchment area which covers The Hague, Rotterdam and Utrecht region. Rotterdam The Hague Airport does not only offer scheduled and chartered commercial flights, but also chartered business flights and recreational flying. By the previous legislation, the airport was bounded to a noise cap of 35Kosten (Ke) zone (figure 1). As of November 1, 2009, the Ministry of Transport, Public Works and Water Management has officially decentralised their regulations of regional airports to the provinces. The new noise cap that Rotterdam The Hague Airport needs to abide now is a 57dB noise level for day, evening and night. The 35Ko was introduced because the government wanted to prohibit residential development from being built within this specified boundary. The airport has to calculate the noise level of its yearly flights and has to ensure that the annual accumulated noise footprints did not exceed the zone; otherwise they have to pay fine to the government. Besides the noise cap, Rotterdam The Hague Airport itself has taken several operational measures such as night curfew between 23h00-07h00, no engine run-up between 18h00-08h00 unless it is authorised by Airpot Authorities and impose noise surcharge for noisy aircraft to reduce noise at its airport.

COMMUNITY PERCEPTION TOWARDS NOISE ANNOYANCE
The reason regulators introduced noise restriction at airports is to reduce the noise annoyance created by the activities at the airport. Aircraft noise can specifically cause sleep disturbances, physiological stress reactions, temporary threshold shifts in hearing, interference with speech and communications, and psychological distress.

As for Rotterdam The Hague Airport, the communities’ complaints are being monitored by a commission known as DCMR Milieu dienst Rijnmond or Environmental Protection Agency in Schiedam. The quar-
Quarterly and yearly report of noise complaints are published and can be accessed by the public on the DCMR website. Residents can complain at any time, either via internet, writing or by telephone, and their complaints will be automatically recorded. The centre will record the location of the addresses and will be linked to the system based on the date and time the complaints are filed. The complaints will then be matched to the type of aircraft flying at that particular time. The Commission on Environmental Hygiene of Airport Terrain (CMLR) has established Committee 28 to conduct quarterly meetings between Rotterdam The Hague Airport and community representatives to address the community complaints.

From the DCMR report for 2008, it was noted that although higher frequency in flight movements increases the number of complaints, the time of the day seems to have a higher influence on the ratio of complaints. It seems that a higher ratio on the number of complaints per flight occurs during the curfew hours (23h00-07h00) compared to the day time ratio, although there are higher number of flights during the day, especially in the afternoon. Besides frequency and time of the day, seasonality, type of aircraft, flight routes, aircraft pitch noise, population distribution, and aircraft approach or descent profile also contribute to complaints and annoyance.

Thus it seems that different types of aircraft have varying influence on community annoyance towards the perception of noise as well. Table 1 shows the type of aircraft that flew at Rotterdam The Hague Airport in 2008 and the highest number of complaints recorded. It can be seen that older generation aircraft like B737-200 received a higher ratio of complaints due to its noisy engines. The table also shows that business jets like Piaggio P180 Avanti or Beechjet flying at night also received higher numbers of complaints compared to other aircraft. Although by calculation and level of noise measured, business jets such as Piaggio P180 Avanti produce smaller noise footprints, however other characteristics such as higher pitch level, unfamiliar noise or flying too low can also contribute to complaints.

**VALUE OF NOISE TO ROTTERDAM THE HAGUE AIRPORT**

There are positive and negative impacts regarding the establishment of the 35Ke noise zone on Rotterdam The Hague Airport revenues. One of the positive impacts is that certain airlines are changing their fleet to new generation aircraft such as B737-700/800. This type of change gives better aeronautical revenues and passenger related revenues to Rotterdam The Hague Airport and at the same time, allows the airport to grow sustainably.

One of the downsides of having noise cap is that the policy restrict the flight movements based on noise footprints calculation. If there are ‘unforeseen circumstances’ that required flights to fly at night, these type of flights will consume the allocated zone faster since the penalty for night flights is ten times more than a day flight. In addition, the night surcharges imposed by Rotterdam The Hague Airport do not compensate for the potential loss of revenues that could be generated by day flights. However, it is difficult for Rotterdam to reject night flights especially from chartered business flights because the airport has to fulfill various stakeholders’ requirements and also need to accommodate flight delays and diverting flights. On top of that, the airport also needs to accommodate medical, search and rescue, recreational, military and government flights, which consume the allocated noise zone too. At present, Rotterdam The Hague Airport’s business consists of 30% high yield passengers and 70% low yield passengers, and the airport considers itself as an airport that offers a mixture of all kinds of traffic.

**CONCLUSION**

Noise restrictions are important to ensure that the quality of life of the community is being protected but on the other hand, regulators should evaluate the effectiveness of the regulation and operational measures and measure their impacts on various aspects, such as economics, social, environmental and political. Therefore, noise at the regional airport needs to be managed wisely, because it has different value to the community happiness, airport revenues, airlines revenues, passengers’ satisfaction, and economics of the regions. If the decision made is made on ones biases, then the benefits and adverse impacts are distributed unevenly between airports, airlines, region and communities, and if that happens, then the value of noise at the airport might be perceived differently, at that time.

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**Table 1. Complaints based on aircraft type for 2008**

<table>
<thead>
<tr>
<th>Type of Aircraft</th>
<th>Flights</th>
<th>Percentage of night flights</th>
<th>Complaints Day</th>
<th>Complaints Night</th>
<th>Complaints/ day flights</th>
<th>Complaints/ night flights</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boeing 737-700</td>
<td>1003</td>
<td>144</td>
<td>12.7</td>
<td>1278</td>
<td>1.3</td>
<td>1.7</td>
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<tr>
<td>Fokker 50</td>
<td>916</td>
<td>135</td>
<td>3.7</td>
<td>1173</td>
<td>1.3</td>
<td>1.7</td>
</tr>
<tr>
<td>Boeing 737-800</td>
<td>372</td>
<td>10</td>
<td>2.6</td>
<td>496</td>
<td>1.3</td>
<td>1.9</td>
</tr>
<tr>
<td>Boeing 737-200</td>
<td>9</td>
<td>0</td>
<td>0.0</td>
<td>129</td>
<td>0</td>
<td>43.0</td>
</tr>
<tr>
<td>Piaggio Avanti</td>
<td>38</td>
<td>6</td>
<td>13.6</td>
<td>52</td>
<td>1.4</td>
<td>3.7</td>
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<tr>
<td>Falcon 900</td>
<td>24</td>
<td>19</td>
<td>44.2</td>
<td>34</td>
<td>1.4</td>
<td>1.5</td>
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<tr>
<td>Gulfstream 5</td>
<td>17</td>
<td>19</td>
<td>52.8</td>
<td>24</td>
<td>1.4</td>
<td>1.8</td>
</tr>
<tr>
<td>Cassina 550</td>
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<td>7</td>
<td>20.0</td>
<td>32</td>
<td>1.1</td>
<td>2.6</td>
</tr>
<tr>
<td>Beechcraft Beechjet</td>
<td>21</td>
<td>6</td>
<td>22.2</td>
<td>27</td>
<td>1.3</td>
<td>3.8</td>
</tr>
</tbody>
</table>

**References**

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