Capacity Expansions of Beijing Capital International Airport

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16.781 Term Project

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Outline

• Introduction of Beijing Capital International Airport
• Development History
• Review of Three Major Capacity Expansions
  – Compare Designed Capacity with Actual Traffic
• Conclusion
Introduction of Beijing Capital International Airport

- Gateway of China
- The only international airport of Beijing

<table>
<thead>
<tr>
<th>Runway</th>
<th>Dimensions</th>
<th>Surface</th>
<th>ICAO Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>01/19</td>
<td>3800 x 600</td>
<td>Concrete</td>
<td>F</td>
</tr>
<tr>
<td>18L/36R</td>
<td>3800 x 600</td>
<td>Asphalt</td>
<td>4E</td>
</tr>
<tr>
<td>18R/36L</td>
<td>3200 x 500</td>
<td>Asphalt</td>
<td>4E</td>
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25.35km
Airport Traffic Characteristics

Annual Traffic Growth

Domestic vs. International Traffic Growth

Average Passengers per Aircraft
BCIA Chronology

- 1955 New airport construction
- 1958 Inauguration of operations
- 1966 Runway (18L/36R) extension
- 1980 New runway (18R/36L) built
  Original runway (18L/36R) extension
  New terminal (T1) built and open
- 1989 Terminal 1 expansion for Asian Games
- 1993 Terminal 1 expansion to 80,000 square meters
- 1999 Terminal 2 built and open
- 2004 Terminal 3 and new runway (01/19) construction
- 2008 Terminal 3 and runway 01/19 open; Beijing Olympic Games
Major Capacity Expansions
Major Capacity Expansions

Annual Traffic

Aircraft Movements (10^4)  Passenger (10^6)

Year:
- T0 & Rwy 18L/36R
- T1 & Rwy 18R/36L
- T2
- T3 & Rwy 01/19

Data points for years 1958 to 2008 are shown with a gradual increase in traffic over time.
REVIEW OF THREE MAJOR CAPACITY EXPANSIONS
1980 - 1st Major Capacity Expansion

- 1980: Runway (18L/36R) extension, New runway (18R/36L), New terminal (T1)
- Terminal capacity: 3.5 million passengers per year
- Runway capacity: Runway capacity: 250,000 ~ 357,000 movements per year
- Seven minor constructions and expansions since 1988
- Terminal capacity: 8 million passengers per year
1999 – 2\textsuperscript{nd} Major Expansion

- 1999: New terminal (T2) (T1 was closed at the same time)
- **Capacity**: 26 million passengers per year; 320,000 aircraft movements per year
- 2004: T1 was opened again
- **Capacity**: 37 million passengers per year
- 2005: Independent parallel runway operation was implemented
- **Capacity**: 420,000 aircraft movement per year
2008 – 3\textsuperscript{rd} Major Expansion

- 2008: New terminal (T3) ; New runway (01/19)
- **Capacity**: 82 million passengers per year, 600,000 aircraft movements per year

**Annual Traffic & Capacity at BCIA**

- Aircraft Movements (10^4)
- Passenger (10^6)

- Further Expansion planned

- 82 mil pax
- 600 k movements
Estimation of Current Runway Capacity

- Traffic Mix: 50% departure, 50% arrival
- Single runway max hourly throughput = 44 aircraft per hour
- Three runways system max hourly throughput = 134 aircraft per hour

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<tbody>
<tr>
<td>Annual aircraft movement capacity</td>
<td>610000</td>
<td>610000</td>
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<tr>
<td>avg. pax per aircraft</td>
<td>120</td>
<td>140</td>
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<tr>
<td>Annual passenger capacity</td>
<td>73 million</td>
<td>85 million</td>
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Summary of Major Expansions

Annual Traffic & Capacity Expansions at BCIA

- 3.5 mil pax
- 8 mil pax
- 26 mil pax
- 37 mil pax
- 420 k movements
- 600 k movements
- 82 mil pax
Conclusion

• Three major capacity expansions are reviewed in the report.
  – The traffic grew at increasing rate. Designed capacity was reached earlier than anticipated. Level of service degraded for relative long periods.
  – Uncertainties is one of the biggest problems in airport development planning. BCIA lacked practices to actively handle uncertainties.

• Future development options include expansion of existing airport or a second airport.
  – One should consider the impacts of each option, which impacts are more desirable, and also which option is more flexible
  – A second airport might be a better option
Questions?