Consideration of passengers’ basic needs for designing efficient railway stations

Dr. Bernhard Rüger
University Assistent
Vienna University of Technology,
Institute for Railway Engineering
Starting position – modal split behaviour

Today’s choices for travelling: car, plane, bus, train

Call for sustainable mobility:
change modal split
bring road traffic to the rail
Question

How can travellers be acquired for using the train?

Which criteria has real influence on the modal split?
Method

• **questioning:**
  Passengers‘ demands and behaviours
  approx. 20‘000 passengers in long-distance-trains
  approx. 1‘000 passengers in local trains (commuters)
  approx. 2‘000 hotel guests

• **censuses, surveys, video analyses:**
  actual passenger behaviour
  passenger censuses, utilisation rate of seats, storage of luggage,
  needed time for entry and exit of passengers
Modal split
decision criteria

luggage transport
mobility at the destination
costs
changing trains
travel time
comfort
level of service
etc.

<table>
<thead>
<tr>
<th></th>
<th>Percentage of Asked Hotelguests</th>
</tr>
</thead>
<tbody>
<tr>
<td>Luggage</td>
<td></td>
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<tr>
<td>Costs</td>
<td></td>
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<tr>
<td>Mobility</td>
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<td>Changing trains</td>
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<td>Travel time</td>
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<tr>
<td>Rail connection at destination</td>
<td></td>
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<tr>
<td>Rail connection at home</td>
<td></td>
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</tbody>
</table>

- **Luggage**: 54% (Summer), 48% (Winter)
- **Costs**: 82% (Summer), 55% (Winter)
- **Mobility**: 77% (Summer), 52% (Winter)
- **Changing trains**: 45% (Summer), 47% (Winter)
- **Travel time**: 41% (Summer), 40% (Winter)
- **Rail connection at destination**: 27% (Summer), 31% (Winter)
- **Rail connection at home**: 26% (Summer), 27% (Winter)
Modal split
decision criteria

combination of criteria is relevant!

percentage of asked hotelguests

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Changing fare</td>
<td>0.6%</td>
</tr>
<tr>
<td>Mobility</td>
<td>3.8%</td>
</tr>
<tr>
<td>Luggage</td>
<td>3.4%</td>
</tr>
<tr>
<td>Fare</td>
<td>1.2%</td>
</tr>
<tr>
<td>Fare + Changes</td>
<td>2.4%</td>
</tr>
<tr>
<td>Mobility + Changes</td>
<td>5.1%</td>
</tr>
<tr>
<td>Luggage + Changes</td>
<td>6.3%</td>
</tr>
<tr>
<td>Mobility + Fare</td>
<td>7.9%</td>
</tr>
<tr>
<td>Luggage + Fare</td>
<td>11.9%</td>
</tr>
<tr>
<td>Luggage + Mobility</td>
<td>8.7%</td>
</tr>
<tr>
<td>Mobility + Fare + Changes</td>
<td>11.8%</td>
</tr>
<tr>
<td>Luggage + Mobility + Changes</td>
<td>17.9%</td>
</tr>
<tr>
<td>Luggage + Mobility + Fare</td>
<td>23.8%</td>
</tr>
<tr>
<td>Luggage + Mobility + Fare + Changes</td>
<td>35.0%</td>
</tr>
<tr>
<td>Luggage + Mobility + Fare + Changes + Traveltime</td>
<td>55.7%</td>
</tr>
</tbody>
</table>
Mobility chain

decision phase

experiences

future modal split behaviour

mobility chain

pre travel phase

travel chain

Travel phase

Changing phase

Departure phase

Post travel phase

customer satisfaction

information

travel documents

travel scheduling

approach to station

link between travel modes

stay on station

departure

train ride

changing

arrival

stay on station

link between travel modes

departure from station

mobility at destination

customer retention
Positive sensations must be maximized, negative sensations must be minimized!
Mobility chain

Each chain is only as strong as the least chain link!

Customer satisfaction is very important along the whole mobility chain
Chain link: station

Station is situated in the centre of the mobility/travel chain

- before, after and during the train ride:
  stay on the station
Link to other means of transportation

Approach to the station/ Departure from the station

• Public means of transportation (tram, underground, bus)
  • Individual motorized traffic (car, motor-bike)
  • Individual non motorized traffic (pedestrian, bicyclists)

The link to all transport modes must be as easy as possible

→ Accessibility is very important for all passengers
→ benefit for all mobility reduced passengers (nearly all)
  → mobility reduced: all kinds of handicapped, persons with baby carriages, travellers with luggage
Stay on the station

Passengers have to stay more or less long on the station

• before the train arrives/ departs
  • when changing trains

Time of waiting

• Has an influence on comfort criteria \( \rightarrow \) modal split
  • is felt subjectively!
• has to be (subjectively) reduced!
Chain link: station

**today's trend:**

Stations become more and more shopping and entertainment centres

*We have to care about the basic needs of passengers*

For reduction of subjective waiting time passengers need:

- useful and comfortable waiting possibilities
- clean toiletts
- shopping and entertaining possibilities
  - \( \Leftrightarrow \) conflict with luggage
  - \( \Leftrightarrow \) it is hardly possible to use attractions
- easy short time luggage deposit is necessary
Passengers’ needs and expectations

TU-Vienna:
• Investigation dealing with needs, expectations and actual behaviour of train passengers.
• Results can be transferred from the train to the station.

Two essential basic needs can be carried out:

• Passengers want to avoid lifting luggage
• Passengers always want to have a visual contact to their own luggage or it is locked securely
**Long distance train travellers - luggage**

Long distance train travellers and luggage go together.

Nearly every long distance traveller has got luggage. 

**Average luggage items per passenger**

- Large: 0.28 – 0.41
- Medium: ~0.66

- Luggage is a main criteria for modal split decision
- Luggage causes most of the difficulties along the travel chain
Today’s typical luggage items

For better understanding but also for designing the knowledge about today used luggage items is essential

Weight:

10 kg (small and medium sized luggage items)
up to 35 kg (large items)

On main travel days nearly each traveler has got at least one item heavyer than 20 kg
basic knowledge about luggage - size

Max. dimensions: 85 x 65 x 35 cm

UIC Leaflet 562: 70 x 50 x 30 cm !!

cross-section

trolley upright

< 65 cm  
< 35 cm

< 85 cm  
50 cm

< 65 cm  
29 cm

< 85 cm  
65 cm

< 65 cm  
35 cm

< 35 cm  
85 cm

medium suitcase

large suitcase
basic knowledge about luggage - size

Max. dimensions: 100 x 43 x 43 cm

UIC Leaflet 562: 70 x 50 x 30 cm !!

large carpetbag
< 43 cm
< 85 cm

medium carpetbag
< 43 cm
< 43 cm
37 cm
37 cm

cross-section

large rucksack
< 100 cm
< 35 cm
< 30 cm
Accessibility for all is very important
Stay and wait on a station - attractive?
shopping – eating/drinking - luggage
Luggage deposits

Luggage deposits for a short time use are essential

Minimum requirements:
• For free → savings through indirect returns
• Easy to handle
• Designed for all kinds of luggage
• No lifting of luggage
Luggage deposits – status quo

- Only a **limited number** of lockers is offered
- Luggage has to be **lift**
- Doors **close automatically** (they should keep open)
- Design is too **small** for large luggage items
- No possibility for storing „unusual“ luggage items
- Very **expensive** for a short time use (e.g.; family with 3 suitcases has to pay 12 EUR, also for 30min)
Limited number – often no lockers available

Op dit moment zijn alle bagagekluizen in gebruik. Probeer het later nog eens.
At the moment no luggage lockers available.

Please try again later.
Height of lockers – luggage has to be lifted
Doors close automatically!
Lockers are often designed too small
Lockers are often designed too small.
actual luggage – size vs. locker size

width!

¥ 10 cm

¥ 2 cm

profile

43 cm

85 cm

65 cm

35 cm

33 cm

43 cm

33 cm

50 cm

65 cm
No space for „unusual“ luggage
Very expensive

No rates for 1 hour

No change!
Example of a good solution

+ Central depositing
+ no lifting of luggage

- Problem: dimensions too small
- price
- no unusual luggage
Example of a good solution
luggage room

+ no lifting of luggage
+ all luggage dimensions are possible
+ also „unusual“ luggage is possible
- price
- opening hours
Conclusion

As a rule multiple reasons are essential, why the train is not chosen. Improvements of separate parts is not meaningful.

Luggage is a very significant deciding criteria not to take the train.

Nearly every long distance traveller takes at least one medium or large luggage item with him.
Conclusion

Accessibility in the whole station is necessary (benefit for all passengers)

Luggage storing must be as easy as possible + cost-free

Nowhere required lifting of luggage

Costumer satisfaction → positive effect on modal split behaviour

(The customer is always right)