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# Carrier or Mode? - The Dilemma of Shippers' Choice in Freight Modelling

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## **Carrier or Mode? - The Dilemma of Shippers' Choice in Freight Modelling**

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### **Abstract**

What choice alternatives do shippers actually have when shipping their products to a customer: do they choose among a number of transport solutions offered to them by transport service providers with certain service characteristics, or is it a choice between physical transport modes (e.g. road, rail, intermodal transport etc.)?

These questions arise regularly in freight demand modelling, when Stated Preference (SP) experiments are carried out to investigate shippers' behaviour in transport chain organisation. Most research published so far has focussed on transport mode choice, whereas more recent projects have considered choice of transport service provider and service specifications and not transport mode explicitly. Both approaches seem justified depending on the specific research question.

This report describes an SP experiment designed to quantify the impact of environmental aspects on the choice of freight transport services. Since the choice of transport mode has an impact on emissions, a combined approach was selected, which integrates both, transport mode and service criteria (i.e. punctuality, transit time, and emissions) as characteristic choice elements.

### **Keywords**

Freight transportation, Freight demand modelling, Transport mode choice, Stated Preference (SP)

### **Preferred citation style**

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# 1.0 Document Description

## Citation

Title: Carrier or Mode? - The Dilemma of Shippers' Choice in Freight Modelling

Identification Number: FreightCarrierOrMode

Authoring Entity: Nikolaus Fries (IVT, ETH Zürich)

Date of Production: 2013-02-18

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## 2.0 Study Description

### Citation

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Identification Number: FreightCarrierOrMode

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## Study Scope

Keywords: Freight transportation , Freight demand modelling , Transport mode choice , Stated Preference (SP)

Abstract:

What choice alternatives do shippers actually have when shipping their products to a customer: do they choose among a number of transport services offered to them by certain transport providers, or is it a choice between physical transport modes (e.g. road, rail, intermodal transport etc.)? This question arises regularly in freight demand modelling, when Stated Preference (SP) experiments are carried out to investigate shippers' behaviour in transport chain organisation. Most research published so far has focussed on transport mode choice, whereas more recent projects have considered choice of transport service provider and not transport mode explicitly. Both approaches appear to be correct depending upon the design context. Researchers, however, often seem to neglect this question, although it is a potentially crucial design factor that must be considered when planning an SP experiment. The effect that this design decision has on freight mode choice models is as yet unexplored. This paper paves the way towards answering the question of which of these alternatives should be adopted and under what circumstances.

## 3.0 File Description

### **File: Freight Modelling - Carrier or Mode.NSDstat**

- Number of cases: 2716
- No. of variables per record: 34
- Type of File: NSDstat 200501

## 4.0 Variable Description

### Variable Groups

- [Freight](#)

#### Freight

Variables within *Freight*

- [Observation Number](#)
- [Respondent Number](#)
- [Choice](#)
- [Alternative 1: Mode \(Road,Rail or Intermodal\)](#)
- [Alternative 1: Price \(CHF\)](#)
- [Alternative 1: Punctuality \(on-time reliability in percent\)](#)
- [Alternative 1: Transit Time](#)
- [Alternative 1: Emission \(Greenhouse-gas emissions\)](#)
- [Alternative 2: Mode \(Road,Rail or Intermodal\)](#)
- [Alternative 2: Price \(CHF\)](#)
- [Alternative 2: Punctuality \(on-time reliability in percent\)](#)
- [Alternative 2: Transit Time](#)
- [Alternative 2: Emission \(Greenhouse-gas emissions\)](#)
- [Alternative 3: Mode \(Road,Rail or Intermodal\)](#)
- [Alternative 3: Price \(CHF\)](#)
- [Alternative 3: Punctuality \(on-time reliability in percent\)](#)
- [Alternative 3: Transit Time](#)
- [Alternative 3: Emission \(Greenhouse-gas emissions\)](#)
- [Alternative 1: Availability](#)
- [Alternative 2: Availability](#)
- [Alternative 3: Availability](#)
- [Rail Availability](#)
- [OwnLorry](#)
- [OwnRailcar](#)
- [Value](#)
- [Weight](#)
- [Perishable](#)
- [Dangerous](#)
- [Distance](#)
- [PunctReq](#)
- [WG](#)
- [ChoiceShipper](#)
- [ChoiceLSP](#)
- [ModeChoice](#)

# Variables



**Variable: Observation Number**

*Range of Valid Data Values: 1 to 2716*

**Summary Statistics:**

*Minimum : 1*

*Maximum : 2716*

*Variable Format: numeric*

**Variable: Respondent Number**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		14
3 .		14
4 .		14
5 .		14
6 .		14
7 .		14
8 .		14
9 .		14
10 .		14
11 .		14
12 .		14
13 .		14
14 .		14
15 .		14
16 .		14
17 .		14
18 .		14
19 .		14
20 .		14
21 .		14
22 .		14

23 .	14
24 .	14
25 .	14
26 .	14
27 .	14
28 .	14
29 .	14
30 .	14
31 .	14
32 .	14
33 .	14
34 .	14
35 .	14
36 .	14
37 .	14
38 .	14
39 .	14
40 .	14
41 .	14
42 .	14
43 .	14
44 .	14
45 .	14

46 .	14
47 .	14
48 .	14
49 .	14
50 .	14
51 .	14
52 .	14
53 .	14
54 .	14
55 .	14
56 .	14
57 .	14
58 .	14
59 .	14
60 .	14
61 .	14
62 .	14
63 .	14
64 .	14
65 .	14
66 .	14
67 .	14
68 .	14

69 .	14
70 .	14
71 .	14
72 .	14
73 .	14
74 .	14
75 .	14
76 .	14
77 .	14
78 .	14
79 .	14
80 .	14
81 .	14
82 .	14
83 .	14
84 .	14
85 .	14
86 .	14
87 .	14
88 .	14
89 .	14
90 .	14
91 .	14

92 .	14
93 .	14
94 .	14
95 .	14
97 .	14
98 .	14
99 .	14
100 .	14
101 .	14
102 .	14
104 .	14
105 .	14
106 .	14
107 .	14
108 .	14
109 .	14
110 .	14
111 .	14
112 .	14
113 .	14
114 .	14
115 .	14
116 .	14

117 .	14
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119 .	14
120 .	14
121 .	14
122 .	14
123 .	14
124 .	14
125 .	14
126 .	14
127 .	14
128 .	14
129 .	14
130 .	14
131 .	14
132 .	14
133 .	14
134 .	14
135 .	14
136 .	14
138 .	14
139 .	14
140 .	14

141 .	14
142 .	14
143 .	14
144 .	14
145 .	14
146 .	14
147 .	14
148 .	14
149 .	14
150 .	14
151 .	14
152 .	14
153 .	14
154 .	14
155 .	14
156 .	14
157 .	14
158 .	14
159 .	14
160 .	14
161 .	14
162 .	14
163 .	14



164 .	14
165 .	14
166 .	14
167 .	14
168 .	14
169 .	14
170 .	14
171 .	14
172 .	14
173 .	14
174 .	14
175 .	14
176 .	14
177 .	14
178 .	14
179 .	14
180 .	14
181 .	14
182 .	14
183 .	14
184 .	14
185 .	14
186 .	14

187 .	14
188 .	14
189 .	14
190 .	14
191 .	14
192 .	14
193 .	14
194 .	14
195 .	14
196 .	14
197 .	14
198 .	14

*Range of Valid Data Values: 1 to 198*

**Summary Statistics:**

*Minimum : 1*

*Maximum : 198*

*Variable Format: numeric*

**Variable: Choice**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		918
2 .		884
3 .		914

*Range of Valid Data Values: 1 to 3*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 1: Mode (Road,Rail or Intermodal)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		887
2 .		881
3 .		948

*Range of Valid Data Values: 1 to 3*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 1: Price (CHF)**

*Range of Valid Data Values: 32 to 88000*

**Summary Statistics:**

*Minimum : 32*

*Maximum : 88000*

*Mean : 2830.438*

*Standard deviation : 8223.77*

*Variable Format: numeric*

**Variable: Alternative 1: Punctuality (on-time reliability in percent)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
85 .		893
92 .		897
98 .		926

*Range of Valid Data Values: 85 to 98*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 1: Transit Time**

*Range of Valid Data Values: 1 to 180*

**Summary Statistics:**

*Minimum : 1*

*Maximum : 180*

*Mean : 25.04*

*Standard deviation : 30.648*

*Variable Format: numeric*

**Variable: Alternative 1: Emission (Greenhouse-gas emissions)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
50 .		887
100 .		897
150 .		932

*Range of Valid Data Values: 50 to 150*

**Summary Statistics:**

*Minimum : 50*

*Maximum : 150*

*Variable Format: numeric*



**Variable: Alternative 2: Mode (Road,Rail or Intermodal)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		918
2 .		889
3 .		909

*Range of Valid Data Values: 1 to 3*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 2: Price (CHF)**

*Range of Valid Data Values: 32 to 88000*

**Summary Statistics:**

*Minimum : 32*

*Maximum : 88000*

*Mean : 2837.851*

*Standard deviation : 8206.598*

*Variable Format: numeric*

**Variable: Alternative 2: Punctuality (on-time reliability in percent)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
85 .		927
92 .		921
98 .		868

*Range of Valid Data Values: 85 to 98*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 2: Transit Time**

*Range of Valid Data Values: 1 to 180*

**Summary Statistics:**

*Minimum : 1*

*Maximum : 180*

*Mean : 25.316*

*Standard deviation : 30.474*

*Variable Format: numeric*

**Variable: Alternative 2: Emission (Greenhouse-gas emissions)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
50 .		881
100 .		909
150 .		926

*Range of Valid Data Values: 50 to 150*

**Summary Statistics:**

*Minimum : 50*

*Maximum : 150*

*Variable Format: numeric*

**Variable: Alternative 3: Mode (Road,Rail or Intermodal)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		911
2 .		946
3 .		859

*Range of Valid Data Values: 1 to 3*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 3: Price (CHF)**

*Range of Valid Data Values: 32 to 88000*

**Summary Statistics:**

*Minimum : 32*

*Maximum : 88000*

*Mean : 2893.681*

*Standard deviation : 8661.306*

*Variable Format: numeric*

**Variable: Alternative 3: Punctuality (on-time reliability in percent)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
85 .		896
92 .		898
98 .		922

*Range of Valid Data Values: 85 to 98*

**Summary Statistics:**

*Variable Format: numeric*



**Variable: Alternative 3: Transit Time**

*Range of Valid Data Values: 1 to 180*

**Summary Statistics:**

*Minimum : 1*

*Maximum : 180*

*Mean : 25.01*

*Standard deviation : 30.805*

*Variable Format: numeric*

**Variable: Alternative 3: Emission (Greenhouse-gas emissions)**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
50 .		948
100 .		910
150 .		858

*Range of Valid Data Values: 50 to 150*

**Summary Statistics:**

*Minimum : 50*

*Maximum : 150*

*Variable Format: numeric*

**Variable: Alternative 1: Availability**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		2716

*Range of Valid Data Values: 1 to 1*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 2: Availability**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		2716

*Range of Valid Data Values: 1 to 1*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Alternative 3: Availability**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1 .		2716

*Range of Valid Data Values: 1 to 1*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Rail Availability**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		1260
1.		1456

*Range of Valid Data Values: 0 to 1*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: OwnLorry**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0 .		1694
1 .		994
99 .		28

*Range of Valid Data Values: 0 to 99*

**Summary Statistics:**

*Minimum : 0*

*Maximum : 99*

*Variable Format: numeric*

**Variable: OwnRailcar**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0 .		2366
1 .		322
99 .		28

*Range of Valid Data Values: 0 to 99*

**Summary Statistics:**

*Minimum : 0*

*Maximum : 99*

*Variable Format: numeric*



**Variable: Value**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
1.5 .		14
2 .		14
3 .		14
9 .		14
30 .		28
40 .		14
96 .		14
150 .		42
153 .		14
160 .		14
161 .		14
175 .		28
180 .		14
193 .		14
200 .		42
230 .		14
275 .		14
300 .		14
400 .		14
500 .		28
600 .		28

650 .	14
800 .	14
850 .	14
860 .	14
920 .	14
950 .	14
1000 .	168
1080 .	14
1100 .	42
1200 .	42
1250 .	56
1500 .	14
1600 .	28
1730 .	14
1800 .	14
2000 .	28
2200 .	42
2375 .	14
2500 .	70
2545 .	14
2700 .	14
2900 .	14
3000 .	56

3500 .	56
3750 .	14
4000 .	14
4500 .	28
5000 .	84
5500 .	14
6000 .	14
6800 .	28
7000 .	56
8000 .	70
8300 .	14
8400 .	14
8700 .	14
8880 .	14
9000 .	28
10000 .	112
10300 .	14
11400 .	14
13500 .	14
15000 .	56
18000 .	14
20000 .	56
24000 .	14

25000 .	70
30000 .	84
32000 .	14
35000 .	28
40000 .	14
43000 .	14
44000 .	14
45000 .	14
47000 .	14
50000 .	84
80000 .	14
99999 .	266
100000 .	42
120000 .	28
180000 .	14
200000 .	14
210000 .	14
214000 .	14
300000 .	14
400000 .	14
500000 .	28
30000000 .	14

*Range of Valid Data Values: 1.5 to 30000000*

**Summary Statistics:**

*Minimum : 1.5*

*Maximum* : 30000000

*Variable Format*: numeric

**Variable: Weight**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		154
1.		238
2.		154
3.		140
4.		98
5.		140
6.		98
7.		84
8.		70
9.		14
10.		84
11.		14
12.		84
15.		140
16.		56
17.		42
18.		84
19.		28
20.		224
21.		28
22.		196

23 .	28
24 .	84
25 .	84
27 .	28
28 .	28
38 .	14
45 .	28
50 .	42
56 .	14
58 .	14
60 .	42
74 .	14
100 .	14
115 .	14
150 .	14
220 .	14
500 .	14
1200 .	14
1300 .	42

*Range of Valid Data Values: 0 to 1300*

**Summary Statistics:**

*Minimum : 0*

*Maximum : 1300*

*Variable Format: numeric*

**Variable: Perishable**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		2338
1.		378

*Range of Valid Data Values: 0 to 1*

**Summary Statistics:**

*Variable Format: numeric*



**Variable: Dangerous**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		2464
1.		252

*Range of Valid Data Values: 0 to 1*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: Distance**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
40 .		14
45 .		14
50 .		140
60 .		42
65 .		14
68 .		14
69 .		14
70 .		14
75 .		28
79 .		14
80 .		28
83 .		28
90 .		28
95 .		14
100 .		28
110 .		28
115 .		14
116 .		14
120 .		56
125 .		14
126 .		14

130 .	56
131 .	14
135 .	14
140 .	28
150 .	84
160 .	42
165 .	14
170 .	28
177 .	14
180 .	42
181 .	14
184 .	14
185 .	14
186 .	14
190 .	56
194 .	14
200 .	70
220 .	14
230 .	14
240 .	42
250 .	14
254 .	14
260 .	28

270 .	14
280 .	14
285 .	14
300 .	70
310 .	14
320 .	14
340 .	14
350 .	56
380 .	14
400 .	70
444 .	14
455 .	14
480 .	28
500 .	84
580 .	42
600 .	42
615 .	14
620 .	14
625 .	14
650 .	14
700 .	280
720 .	28
728 .	14

750 .	70
780 .	14
800 .	182
850 .	42
880 .	14
892 .	14
900 .	42
1000 .	56
1200 .	42
1400 .	28
1500 .	42
1550 .	14
1800 .	14
2500 .	14

*Range of Valid Data Values: 40 to 2500*

**Summary Statistics:**

*Minimum : 40*

*Maximum : 2500*

*Variable Format: numeric*

**Variable: PunctReq**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0 .		42
1 .		392
2 .		280
3 .		98
4 .		252
5 .		98
6 .		168
7 .		14
8 .		266
9 .		14
12 .		196
24 .		518
36 .		14
48 .		224
70 .		14
72 .		98
96 .		28

*Range of Valid Data Values: 0 to 96*

**Summary Statistics:**

*Minimum : 0*

*Maximum : 96*

*Variable Format: numeric*

Variable: WG

Value	Label	Frequency
1.		84
2.		546
3.		476
4.		252
5.		196
6.		1162

*Range of Valid Data Values: 1 to 6*

**Summary Statistics:**

*Variable Format: numeric*

**Variable: ChoiceShipper**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		812
1.		1904

*Range of Valid Data Values: 0 to 1*

**Summary Statistics:**

*Variable Format: numeric*



**Variable: ChoiceLSP**

<b>Value</b>	<b>Label</b>	<b>Frequency</b>
0.		1988
1.		728

*Range of Valid Data Values: 0 to 1*

**Summary Statistics:**

*Variable Format: numeric*

Variable: ModeChoice

Value	Label	Frequency
Sysmiss .		2716

**Summary Statistics:**

*Variable Format:* numeric

## 5.0 Other Study-Related Materials

Label: Dissertation Fries

Text: See section 5.1.4 (ff)