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*Analyse conjointe SP/RP du
choix du mode de transport de
marchandises dans la Région
Nord — Pas-de-Calais*

*(A Simultaneous SP/RP Analysis of
Mode Choice in Freight Transport in
the Region Nord — Pas-de-Calais)*

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*Préparé pour le Ministère de l'Équipement, du Logement,
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Summary and conclusions

In this project for MELTT, Hague Consulting Group (HCG) has designed a Stated Preference (SP) survey for shippers in the region Nord-Pas-de-Calais and estimated discrete choice models on the resulting SP data and on Revealed Preference (RP) data from a shippers' survey. The objective of this research project was to gain insight into the factors that influence the mode choice of shippers.

The RP survey was carried out in the region Nord-Pas-de-Calais by INRETS in 1998 and contains interviews with 215 shippers and focused on 3 recent shipments. A sub-sample of these was re-contacted for the SP survey. The SP interviews were carried out by ISL in 2000 among 98 shippers. These SP interviews included experiments on one or two shipments. The SP contains information on 149 shipments in total, by road own account transport, road hire and reward, train, combined transport and maritime transport.

The SP interviews took place by using a questionnaire, designed and programmed by HCG, on a portable computer. This questionnaire contained two different SP experiments, both set in the context of a shipment that was actually carried out (contextual SP):

- A 'within mode' experiment in which the respondent was presented hypothetical alternatives all referring to the mode actually chosen for the specific shipment.
- 'Between mode' experiments which contains binary choice situations that include the chosen mode and an alternative mode.

The attributes used in these experiments include travel time, travel cost, reliability (probability of delay), availability of logistic services, flexibility and frequency.

Disaggregate logit models have been estimated, for the within mode data, for the between mode experiments and on the joint SP/RP data.

The 'within mode' experiment data are most used for giving value of time estimates and for monetary values for other shipment attributes. Values of freight transport time savings used in several countries (e.g. The United Kingdom, The Netherlands, Scandinavian countries) have been derived from such experiments. Imposing a mode choice context, as in the 'between mode' experiments and in the model on the RP data, gives a situation with a limited scope for trade-offs between different attributes. The logit model on the Nord-Pas-de-Calais 'within mode' SP data shows that a 10% change in transport time is equivalent to a 5% change in transport cost. The sample size was sufficient to derive a value of time for only one of the modes: the value of time from this experiment is about 70 FF/hour/shipment for road hire and reward. This value is well within the range given in the existing literature (de Jong, 2000).

Valuations such as the above can be used in evaluation, but do not answer the question which variables are most important in mode choice. The models on the 'between mode' SP experiment and the RP data can be used to give an answer here.

According to the estimation results on the 'between mode' SP data, the following variables are important for the choice of mode in freight transport:

Attributes of the shipment (by mode):

- Transport cost
- Transport time
- Probability of delay
- Availability of logistic services suitable to the commodity
- Capability of quick reaction to unforeseen requests
- Frequency.

Attributes of the shipment (generic):

- Value density of the shipment
- Goods on pallets or not
- Type of commodity (food, metal, petrol, agriculture).

Attributes of the shipper:

- Access to rail for shipper
- Annual weight of transports.

In the model on the RP data, for many shipments information on transport times and cost for the chosen mode was missing. Furthermore, there was no information on the attributes of non-chosen modes. All of this had to be estimated, using equations that can only be regarded as rough approximations of the true cost and times. In multinomial logit models with four alternatives (road own account, road hire and reward, rail and combined transport), on the RP data it proved not to be possible to estimate coefficients with correct signs for both transport cost and time. This problem is related to the high degree of correlation between these variables. This is a problem that is often encountered in estimating mode choice models on disaggregate RP data (not only in freight transport, this also frequently occurs for mode choice in passenger transport). This is precisely one of the arguments for carrying out SP. SP is not only often done in situations in which one of the alternatives does not exist yet (e.g. a new tunnel for which demand is to be evaluated). It is also used in situations in which all alternatives exist, but where the attributes are highly collinear. In the SP, alternatives with attributes that are not or only weakly correlated can be offered, because the researcher can determine the experimental design.

It was possible to estimate a discrete choice model on the RP data without time and cost attributes, similar to the model by Jiang et al (2000) on the French 1988 RP shippers' survey. The variables, which according to this new RP model, are important in explaining mode choice are:

Attributes of the shipment (generic):

- Transport distance
- Frequency of similar shipment to the same client
- Value density of the shipment.

Attributes of the shipper:

- Access to rail for shipper and receiver
- Ownership of lorries
- Annual weight of transports.

When the RP data are combined with the SP data (from both experiments) and a joint model is estimated, it appears to be possible to obtain correctly signed coefficients for transport time and cost. In transport research, the use of SP for obtaining relative valuations (trade-off ratio's) is nowadays widely accepted, but for forecasting it is necessary to use RP data as well (to base the forecasts on the real choice context and the variation that this contains). Given the problems encountered with the RP with regards to the time and cost variables, it is recommended to pay particular attention to the collection of data on time and cost in the new French national shippers survey under preparation. As this new survey would give a much larger sample than the Nord-Pas-de-Calais sample used in this paper, the quality of estimates for missing variables and alternative modes would anyhow be certainly improved. Whether or not to re-contact in addition a part of the shippers for an SP survey and use the SP data simultaneously with the RP data to derive a disaggregate model for mode choice forecasting, is a question that still has to be considered.

In the combined SP/RP model we estimated for Nord-Pas de Calais, the values of time for the road hire and reward, the only mode for which we had sufficient data, are generally lower than in the 'within mode' SP model. In the model on the 'between-mode' SP data, the values of time for this mode are between those from SP within-mode and RP alone. This is probably caused by the limited possibilities for trading off in mode choice, when compared to choices within a mode.

The variables which are important in the joint SP/RP model are:

Attributes of the shipment (by mode):

- Transport cost
- Transport time
- Probability of delay
- frequency.

Attributes of the shipment (generic):

- Whether the shipment is part of a circuit
- Value density of the shipment
- Goods in parcels or not.

Attributes of the shipper:

- Access to rail for shipper and receiver
- Ownership of lorries
- Annual weight of transports.