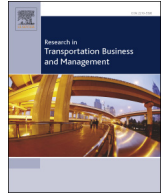




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Transport buyers choice of transport service – A literature review of empirical results

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1. Introduction

Understanding the choice of transport service is a key issue in understanding the transport market, designing a competitive transport system and, in particular, achieving a shift towards intermodal transport. The selection of transport service has received increased interest in recent years, particularly in relation to the increased focus on intermodal transport, caused by large political focus on reducing the dominance of road transport and thus leading to subsequent large research attention to intermodality (cf. Bontekoning, Macharis, & Trip, 2004; European Commission, 2001). To recognize the challenges in attracting freight to intermodal transport and to design a competitive transport system in general, it is of key importance to identify which factors are important to the customer. A core component in intermodal research is thus to study the modal split and competition between transport modes. The modal choice is a decision made based on the combined performance of a number of factors, such as price and quality, where the different actors have different values, perceptions, and criteria for the selection of transport solutions (Woxenius & Bärthel, 2008). To understand the modal choice thus requires an understanding of the underlying factors. This knowledge is not only important for industry actors in designing competitive transport solutions, but also for society in help building and supporting an efficient transport system. Policymakers in particular have a keen interest in understanding the challenges and opportunities associated with the different modes of transport and potential transport services.

Consequently, choice of transport service has received large interest in the research community and several studies have been conducted. However, the studies show disparate results to some extent and have been conducted in different settings, with different focus and using different methods. Thus, there is a need to summarise and compare these different studies to gain a better understanding of the factors influencing the choice of transport service.

The purpose of this paper is to make a literature review and comparison of previous studies on the transport service choice for freight and to identify important factors behind the choice. Implications for

intermodal transport will be considered in particular. What separates this literature review from previous reviews (e.g., Meixell & Norbis, 2008 and Karlsson, 2008) is a focus on the actual mapping of real customer attitudes and preferences and a widened scope, which includes non-peer reviewed sources. Implications for business and management include a better knowledge of customer demands, which could help managers design more competitive transport systems.

The review focuses on peer-reviewed European studies during the last 26 years, from 1990 to 2016, published in English and Swedish. The peer-reviewed studies are complemented by non-peer review publications, or the so-called “grey literature” of reports and on-line publications. Today, much research is only published outside the traditional academic channels and to completely ignore this research bears the risk of missing relevant studies (White, 2014; Woxenius, 2015). However, it is important to recognize the potential difference in research quality between these groups and to keep them separate when analysing the data. Publications in Swedish were selected since the authors are Swedish and are familiar with possible publication sources.

The review includes studies on European conditions based on primary data. Thus, it is a requirement that the study has made some kind of empirical data collection where the actual opinion of the transport customer has been studied. It does not include modelling approaches or analyses based on statistical data. Cases studies were also excluded. To only include studies that have directly collected data from the transport customer is likely to come closest to revealing the real influencing factors.

The paper starts with an introduction, followed by a methodology section, after which the review results are presented. This is followed by analysis and conclusions.

2. Methodology

A four-step approach was applied for the literature review. Firstly, a large scientific database was used to find peer-reviewed journal publications. Science Direct, one of the largest databases covering more than 12 million articles, was used. A list of relevant actors and activities were identified by the authors and used in the search in all fields in the database. The actors identified included shippers, forwarders, carriers, transport customers, hauliers, transport service providers, logistics service providers, consignors, and consignees. The activities identified were selection, perception, preferences, and behaviour/behavior. Each

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combination of actor word and activity word were used in the search; e.g., shipper perception, shipper preference. In addition to this, the terms modal choice, mode choice, modal split, and freight service selection were used. After excluding clearly irrelevant topic areas in the search, such as Medicine and Pharmacology, 841 hits remained. All hits were checked by the authors. Most hits were identified as not in the field of logistics and transport based on their title, as the search was made wide to reduce the risk of missing any papers. Secondly, to find the grey literature and to cover any journals not included in Science Direct, Google Scholar was used with the same key words as above. Thirdly, to further cover any parts of the grey literature not included in Google Scholar, the regular Google search engine was used. A challenge with the two Google search engines was the very large number of hits returned; e.g., “modal split” on Google generated 2.3 million hits. For obvious reasons, it was impossible to check all hits. Each search was therefore further refined by adding transport related words that were likely to occur somewhere in the text, such as forwarder, freight, road, and rail. Both Swedish and English key words were used. Further, as Google sorts the hits by relevance, the relevance of the hits sharply declined after the initial hits. It is unfortunately impossible make a complete investigation of all hits on the Internet, but we do believe we made as thorough a search as possible of the Internet within a reasonable time frame. Fourthly, previous reviews (e.g., Karlsson, 2008) and the reference lists in all found sources were also checked to further reduce the risk of missing any relevant studies.

3. Literature review

In total, 38 relevant publications were identified through the literature search. See Table 1.

The reports are a diverse group, comprised of reports produced by research consultancies, government agencies, and universities. A licentiate thesis is an intermediate degree halfway between masters and PhD that is common in Sweden. Both licentiate and doctoral dissertations contain research work largely from Swedish universities, which likely can be attributed to the fact that dissertations are often not publicly published or widely distributed. As the authors of this review are Swedish, it is therefore likely that we have greater access to Swedish dissertations. The conference proceedings (5) are mainly from the NOFOMA (The Nordic Logistics Research Network) and WCTR (World Conference on Transport Research) conferences. These were mainly found through Internet searches and reference lists in other papers, indicating an obvious lack of a common database for conference proceedings.

Most sources are in English, as it is the most commonly used language in international journals and research (see Table 2). Non-peer reviewed studies are mainly in Swedish.

Table 3 shows the historical distribution of the literature. A majority of the sources (58%) were published in the decade after 2000 (2000–2010), with a further 21% published after 2010. As suggested by Woodburn (2003), it could be that transport service choice issues are gaining importance among shippers as road transport costs increase and congestion creates problems in the current solutions. Also, in the research community there is a general trend of increasing numbers of articles published in recent years (Jinha, 2010).

Table 1
Overview of sources.

Type of source	Peer-review	Non-peer review
Journal article	16	0
Report	0	11
Conference proceeding	5	0
Doctoral thesis	3	0
Licentiate thesis	3	0
Sum	27	11

Table 2
Source language.

Language	Peer-review	Non-peer review
English	26	2
Swedish	1	9
Sum	27	11

A majority of the papers reviewed focus on Northern Europe; see Table 4. Most of the studies use data only from one country (often even a specific region within the country). Interestingly, there are few papers from large countries in Europe, such as Germany or France. This might be attributed to the fact that relevant research is published in local languages, and thus is not a part of the current review.

A list of all articles, methods, analysis techniques, countries, and types is available in Appendix A, with a summary of the key findings in all articles in Appendix B.

3.1. Key factors

A number of key factors reoccur in most of the articles: cost, transport quality, reliability, and transport time. This is in line with previous research that also identifies the same common factors (Cullinane & Toy, 2000).

However, a challenge when comparing the articles is the lack of common definitions and common studied factors. The studies range from simply including 3–4 general factors (e.g., cost and time) to including more than 30 detailed factors. In many cases, the factors used are not defined at all, making it difficult to value and compare the results of different studies. Therefore, the factors used here should be interpreted as a fairly wide and general description of the terms.

Determining the relative importance of each factor is further complicated by how the results are presented in the studies. A few (e.g., Ludvigsen, 1999; SIK, 2000; Vannieuwenhuysse, Gelders, & Pintelon, 2003; Berdica, Jäppinen, Ohnell, Ottoson, & Stjärnekull, 2005; Lammgård, 2007; and Engström, 2007) present ranking lists of the most important factors, but most results are presented as trade-offs. This could be either the respondents' answer to a given statement (e.g., “Are you willing to replace your current transports with environmentally friendly transport if the price is increased by 10%?” (Posten, 2008)) or a calculated elasticity or trade-off (e.g., a 1% point increase in reliability is valued at a cost reduction of 770 Austrian schillings per shipment (Maier, Bergman, & Lehner, 2002)). The results within the same text might also be difficult to compare. For example, a 15% change in frequency and a 19% reduced risk of delay are both worth a 1% change in transport cost (Lundberg, 2006). Does this mean that frequency is more important than delays, or is it the opposite?

3.1.1. Cost

The most obvious factor mentioned in all articles is cost. Cost is ranked as the most important factor by the following: Widlert, 1990; Widlert & Lindstedt, 1992; Vannieuwenhuysse et al., 2003; Lundberg, 2006; Punakivi & Hinkka, 2006; Danielis & Marcucci, 2007; Feo, Espino, & García, 2011; Beuthe & Bouffloux, 2008; Fries, 2009; Guilbault & Cruz, 2010; Bergantino, Bierlaire, Catalano, Migliore, & Amoroso, 2013; and Lammgård & Andersson, 2014. Cost is among the top factors in most of the other studies. The importance of cost is also shown by the fact that several studies use it as a benchmark to value other factors against; e.g., how much is a shorter transport time worth?

Several studies also show that cost is significant; however, it is not necessary to have the lowest cost, as other quality factors are also included in the mode selection (Danielis, Marcucci, & Rotaris, 2005; SIK, 2000; Lammgård, 2007). Having one of the lowest prices is given low importance in the studies by SIK (2000) and Lammgård (2007). The survey by Lammgård also asks the same respondents to distribute 100% on the factors of price, transport time, on-time delivery,

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