



Effect of transport transfer quality on intercity passenger mode choice

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ABSTRACT

Intercity transport is the forgotten step child of transportation behavioural research; so many important questions, such as how important are the various attributes of transfer quality in a traveller's journey, are not often examined. Intermodal and multimodal passenger transport, unlike intermodal freight transport, carry the unique combination of a requirement to transfer between vehicles, in addition to cargo (passengers) with the ability to choose other modes based on a wide variety of factors including difficulty of transfer, availability of automatic baggage transfer and comfort. Our research aims to shed light on the relative importance and interrelations of these transfer attributes by analysing the limited range of European studies that value transfer quality attributes and compare and contrast them with each other. To support this, we collect our own study data which are used to evaluate questions that arose out of the analysis. The few studies that value European intercity transfers vary widely in their valuations, and so taking into context the countries, methodologies, samples, question framing and other metrics specific to each study, we establish links between the valuations and other data not explicitly discussed in those studies to the end of presenting a framework for understanding passenger valuation of intercity transfers. We also suggest some driving factors that may affect one or more of the transfer quality attributes that have not been discussed in the literature, such as perceived trip difficulty and traveller expectations.

This work illustrates and investigates the various elements that may affect how passengers perceive the connections required for travel across transport networks and how they make choices based on those perceptions.

1. Introduction and background

To bring us closer to a sustainable transportation system, many recommendations have been made, including that of accessibility improvement. Geurs and van Wee (2004) define accessibility as how well transport systems enable individuals to reach activities and destinations by means of a (combination of) transport mode(s). It is clear therefore, that understanding how modes can work in close combination better, *intermodality*, can benefit the long term sustainability of transportation systems (Bak et al., 2012). Mueller et al. (2004) define passenger intermodality as “...a policy and planning principle that aims to provide a passenger using different modes of transport in a combined trip chain with a seamless journey...” This seamlessness is the focus of this research. We look at intercity transport, which, although only representing 2–10% of total trips, represents 30–45% of global passenger-kilometres (Bak et al., 2012; Hayashi et al., 2015; Mueller et al., 2004).

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Table 1
Connection quality indicators found in the literature.

Concept	Quality indicator	Source
Transfer time	Waiting time between connecting services	Román and Martín (2014) and Wardman (2001)
Services	Automatic Baggage transfer availability Availability of Other Services at the transfer station	Chiambaretto et al. (2012), Dell’Olio et al. (2011), Román and Martín (2014) and Wardman and Tyler (2000)
Effort	Horizontal Distance to walk between connecting services Vertical distance (number of floors) between connecting services	Guo and Wilson (2011)
Uncertainty, reliability	Connection insurance availability	Román and Martín (2014) and Schakenbos (2014)
Comfort	Human congestion between connecting services	Li and Hensher (2011)
Access and egress	Access and Egress Time to the first and last transport connection points.	Wardman and Tyler (2000)
Trip information	Availability of Holistic information for trip planning Information Updates during trips	Dell’Olio et al. (2011) and Watkins et al. (2011)

While much research has listed aspects that can be considered to make transport services more “seamless”, Wardman notes that service quality attributes have not received attention in the literature (Wardman, 2001), hence we examine them in greater detail than previously done. In comparison to freight transportation, where the cargo is passive, passengers can voice their concerns about the quality of connectivity of passenger services, perhaps orally, perhaps in writing, perhaps digitally, or perhaps they can voice their discontent simply by choosing another travel option, which is often the car if travellers are not otherwise captive. Adequate research on the negative external effects of over use of cars is already published elsewhere (Banister, 2008; Greene and Wegener, 1997).

1.1. Transport connectivity quality

What *defines* the quality of connectivity and how does one *measure* connectivity quality? Previous research has listed numerous variables as indicative of the quality of an intermodal trip, and these are summarised in Table 1.

In various ways, researchers have attempted to evaluate these attributes for intercity travel. The present authors are yet to see them all evaluated together. So this paper aims to shed some light on the complexity of the relationships among these attributes and others related to intercity transport. Although we list *Trip Information* above, we found no valuations for it in intercity travel. We therefore only mention here that studies indicate that some informational services such as mobile co-modal travel planners and live mobile phone travel time information can lead to mode shift from car to public transportation,¹ but the size of that impact is not measured. We analyse the other variables in the analysis below.

1.2. Approach

The target of this investigation is the relationship between the quality of service connectivity and passenger choice (see Allard and Moura (2016) for a review of a wide range of research on passenger intermodality). We aim to measure some of the indicators of connection quality for long distance trips for passengers, and indicate how they impact mode choice through willingness to pay values. We perform an intercity mode choice study with survey data collected from the Iberian Peninsula in order to value the connectivity variables shown above. Then we compare the approaches, definitions, populations, backgrounds, and statistical output of a collection of other studies as well as our own to help explain the large variation seen in their valuations, and where there is insufficient evidence, we speculate on what may have led to the variations found. We also examine the impact of different trip characteristics, travel types, and socio-demographic differences on choice. We summarize this with recommendations to policy makers based on our analysis.

1.3. Paper structure

In the following Section 2, we present the development and results of a study we performed in the Iberian Peninsula to develop our own valuations for connectivity attributes. We aimed to provide sufficient detail to allow the reader to compare and contrast our methodology to others. Section 3 reports on a detailed comparative analysis of our research results against those already published in the literature, and finally we present our framework for understanding intercity transport connectivity along with recommendations in Section 4 before presenting conclusions in Section 5.

¹ <http://81.47.175.201/compass/index.php>, accessed 9 November, 2015.

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