



# Evaluating the impacts of transport backcasting scenarios with multi-criteria analysis

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## ABSTRACT

Scenario analysis and backcasting methods have been used to determine sustainable transport futures, often with a clearly defined process and the use of experts. This paper diverges from this commonly used approach by presenting a more collaborative and unstructured framework to backcasting that allows the experts to have a much greater part in defining the process and the outcomes. The focus is on the evaluation stage that is operationalised by a multi-criteria analysis (MCA) where the experts themselves have the opportunity to discuss, rank and evaluate the policy packages. The spatial context (Andalusia in Spain) is taken as the laboratory, and regional and local policy-makers are engaged in a series of workshops facilitating an open deliberative process, where MCA is combined with face-to-face discussions, and both of them are integrated with transport scenario analysis. This ‘collaborative appraisal framework’ consists of presenting the methodological process, the identification of sustainability impacts, the ranking of those impacts according to three different policy pathways (lower carbon emissions, technological innovation, and urban compactness), as well as commenting on the feasibility, acceptability and potential barriers of such policy options. The paper ends with comments on the usefulness of open-ended and participatory approaches in transport backcasting studies, in particular the use of MCA in identifying and evaluating transport decisions.

## 1. Introduction

The backcasting approach has been increasingly used in transport to illustrate what policies might be introduced to help achieve challenging future targets on climate change, pollution and resources used (Hickman and Banister, 2014). Its distinctiveness lies in taking a normative view of desirable endpoints in the future, and then combining policy packages (e.g. Low emission vehicles; Technological innovation; Liveable cities) that provide different pathways to reach the desired transport futures (Åkerman and Hojer, 2006; Vergragt and Quist, 2011). A number of different stages during the backcasting process can be identified (Banister and Hickman, 2013). The first is the “visioning phase”, that establishes desirable endpoints in the longer-term contrasting with the business-as-usual (BAU) projection (Soria-Lara and Banister, 2017a). The second stage is the “policy packaging”, based on elaborating a series of policy packages that might help in reaching the images of desirable futures, with detailed pathways and timelines for implementation (Soria-Lara and Banister, 2017b). The third stage is the “appraisal phase”, focused on assessing the wider impacts of transport policy-pathways against environmental, social and economic issues, as well as the feasibility, acceptability, and barriers of

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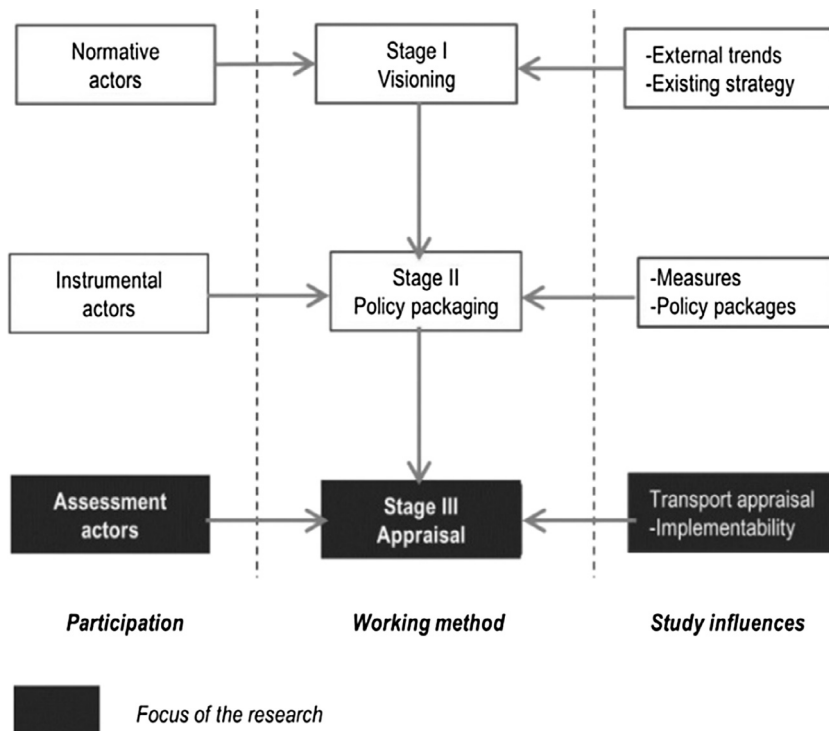


Fig. 1. The structure of the backcasting process. Adapted from Banister and Hickman., 2013 p. 286.

such policy trajectories (Hickman et al., 2012). The “appraisal phase” of transport backcasting scenarios is the main focus of this paper (Fig. 1).

The academic literature on transport backcasting studies has traditionally focused more on developing innovations on the phases of “visioning” and “policy-packaging” than on the “appraisal phase” (Hickman et al., 2012). As a consequence of this, there has been a gap between academic backcasting studies and real transport practice – the implementation gap (Banister and Hickman, 2013). This means that backcasting is seen as an essentially academic exercise with low level of application as appraisal is not fully addressed. The focus of transport backcasting applications has been to concentrate on the visualisation of desired futures and the subsequent creation of policy-pathways schemes. Under this structure, a narrow group of actors are involved to help identify the drivers of change, the policy measures and the packages to be used. Issues relating to policy-schemes implementation, value, and acceptability are not normally part of that process (Ashina et al., 2012; Markus and Jonsson, 2006; Mattila and Antikainen, 2011; Schade and Schade, 2005; Winyuchakrit et al., 2011). Moreover, the rigid structure of the backcasting process constrains its implementation against the emergence in real practice of collaborative planning approaches, as these are more unstructured, and mainly based on interactions between stakeholders and multiples professional domains (Habermas, 2007; Innes and Booher, 2010; Soria-Lara and Banister, 2018). In sum, the lack of a practical framework for assisting policy-makers in deciding which policy-pathway should be followed potentially reduces the practical usefulness of the scenarios. The assessment of transport backcasting scenarios by using multi-criteria analysis (MCA) is seen here as a promising solution for the following reasons.

Firstly, MCA has been traditionally and successfully used in the field of transport to solve complex decision problems by constructing a hierarchy of criteria for assessment (Gerçek et al., 2004; Wang et al., 2014). Secondly, MCA can be used to rank the likelihood that a range of sustainability impacts (environmental, social, and economic) can be generated for the implementation of the proposed policy pathways in the longer-term (Hickman et al., 2012). Thirdly, MCA can be easily combined with other participatory methods, triggering a more flexible assessment framework that facilitates the engagement a wide range of stakeholders during the assessment process (Zubaryeva et al., 2012b; Vermote et al., 2014). This last point is central in the context of shifting the paradigm towards more collaborative planning approaches, primarily based on stakeholders’ participation and interaction (Bertolini, 2007).

Based on these important issues, this paper has developed a collaborative framework for the “appraisal phase” of transport backcasting studies. It is based on combining MCA with other participatory methods, and their integration with transport scenario analysis. This facilitates the creation of a “collaborative appraisal framework” that can assist policy-makers in deciding how the implementation of transport policy schemes can be made more central to the scenario building process. The context of the transport

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