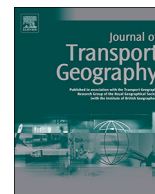




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# Co-creating value through renewing waterway networks: A transaction-cost perspective



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## ABSTRACT

Since modern waterway networks are increasingly confronted with ageing assets, waterway renewal will increase in importance for western countries. Renewal can be regarded an impetus for realising integrated waterway networks that internalise externalities, which entails broad stakeholder involvement. This can be coordinated through different inter-organisational structures. Applying a transaction-cost perspective, we contribute to the assessment of effective governance arrangements for renewing waterway networks in such an integrated fashion. Our aim is to examine efficient inter-organisational structures for waterway renewal, as perceived by actors involved in a case study of the Dutch waterways. Our findings show that waterway renewal incorporates additional functionalities in terms of capacity (expansion or reduction), but not so much in terms of quality (combining transportation aims with spatial objectives such as ecology or regional development). Inter-organisational structures that address geographical interrelatedness and, hence, broader stakeholder involvement were associated with uncertain and time-consuming transactions, because of extensive negotiations regarding the alignment of conflicting interests and the crossing of geographical and administrative boundaries. Also, a change in interdependency from hierarchical towards contractual relationships was required, putting dominant actors (the national government) in an unfamiliar position in which they loosen their grip on infrastructure investments. Perceptions on transactions centre on sectoral aims and individual assets, whereas the actual transaction may be different if a perspective is taken that includes the greater waterway system, the wider spatial surroundings and a longer-term horizon. We conclude that short-term, transportation objectives overrule longer-term, integrative objectives, which withholds strategic considerations required for aligning waterway interests.

## 1. Introduction

Waterway networks are among the oldest as well as the most heavily used transportation systems. These networks are confronted with a major challenge: ageing assets. In the upcoming decades, vast investments are required to ensure the functionality (Gil and Beckman, 2009; IMF, 2014; OECD, 2014a). A major number of these assets, such as weirs, bridges and navigation locks, were built in the course of the 20th Century and currently reach their technical end-of-life. Consequently, these have to be renovated, replaced or renewed, which introduces the need to reconsider existing functionalities of the ageing assets in regard to both capacity (reduction or expansion) and quality (removing or including supplementary objectives related for instance to recreation, ecology or regional development). Initially designed for demands back then, the renewal and renovation of infrastructure assets is considered a window of opportunity to upgrade waterway systems to

current and future demands (Frantzeskaki and Loorbach, 2010).

Translating this opportunity into economic terms, renewal can become an impetus for a better use of waterway resources. Since the late 1990s, integrated forms of waterway planning have been proposed in which infrastructure investments are aimed at not only sectoral transportation objectives, but also additional societal goals (Notteboom and Winkelmans, 2007; Hijdra et al., 2015). For instance, the creation of ecology-friendly river banks can benefit both the transportation and ecological function of a waterway. Accordingly, waterways have become multi-functional networks (Caris et al., 2014). There exists a wide array of integrated waterway planning approaches for coordinating renewal investments, which requires interactions between actors seen for instance in partnering, outsourcing or consulting stakeholders (Hijdra et al., 2014). Waterway renewal can therefore be considered an organisational question, in which infrastructure investments can contribute to aligning objectives and internalising externalities. In this

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conceptualisation, we consider redeveloping waterway networks as a form of voluntary collective action between different governmental bodies (and private actors) through the alignment or merger of interests that mutually profit both sides (Alexander, 1992). These actors are often highly dependent on each other, for example because of the location-specificity of waterway investments (Reve and Levitt, 1984). Shared waterway investments often involve long time horizons and extensive negotiations, in which actors cannot simply drop out as they will lose their investments made at particular sites. We can differentiate between transactions that include a broader geographical area and (hence) a wider array of stakeholders (aimed at internalising externalities), and transactions that centre purely on particular waterways (leaving the externalities untouched). Recent research indicates that, in the face of waterway renewal, western planning practice is in search of suitable organisational forms (e.g., Malekpour et al., 2015; Roovers and Van Buuren, 2016; Willems et al., 2016).

For selecting the most efficient inter-organisational form, the transaction costs seem to be a determining factor. Transaction costs “can be seen as all the costs around a transaction other than the production costs” (Lai, 1994: 84). This includes, among other things, establishing relationships, gaining trust and enforcing agreements. Accordingly, “transaction cost economics explains how and why costs arise from the ways in which we organize to carry out tasks” (Whittington, 2012: 272). In the domain of transport planning, this can be seen in, for example, research on the regulation of private involvement in infrastructure provisioning (Gil and Beckman, 2009; Soliño and Gago de Santos, 2010), the integration of services (Franc and Van der Horst, 2010), and political processes surrounding transportation planning (Sager and Ravlum, 2005). Transaction cost economics thus offers a lens on the effectiveness of governance arrangements. Until now, limited research has been conducted on coordination forms for integrated waterway approaches that stakeholders consider efficient for the organisation of waterway renewal. Transaction cost economics research typically uses expert opinions to estimate *ex-ante* the types of transaction costs that can be expected and, subsequently, to categorise governance approaches (McCann et al., 2005). Based on these perceived transaction costs, (modifications of) inter-organisational structures are proposed to improve the alignment of interests. In extremes, this can result in either a hierarchy in which one public government is responsible for all waterway-related interests, or a market situation in which waterway-related organisations voluntarily undertake exchanges to their mutual benefit (cf. Coase, 1960). In practice, often hybrid forms of inter-organisational co-operation are established, such as partnerships or joint ventures (Williamson, 1999a, 2000).

This article aims to explore (i) the transaction costs that key stakeholders associate with different approaches for waterway renewal in order to internalise externalities and (ii) its implications for waterway planning by identifying risks and institutional barriers. To this end, we focus specifically on a case study of the mature Dutch national inland waterway network, in which the oldest assets date back to as far as the beginning of the 20th century. This case study was selected on the basis of its high information level. First, the Netherlands can be considered an international frontrunner with regards to waterway management (OECD, 2014b) and has started several large research programmes that explore innovative approaches for renewal. Second, waterways are of pivotal importance to the Netherlands, as a result of which a diverse set of renewal approaches can be expected. Our research question is: “What transaction costs do key stakeholders associate with possible inter-organisational structures that address Dutch national waterway system renewal?” This research will empirically contribute to the examination of feasible renewal approaches for waterway planning practice in the western world. Theoretically, applying transaction cost economics to the field of transportation helps to build understanding of why waterway investments for renewal are organised in specific ways.

The article is structured as follows: the second section discusses the theoretical framework in which transaction reasoning is explained

further in relation to infrastructure investments. A framework is presented for analysing transaction dimensions to establish agreements for these investments. The third section introduces the case study and presents the methodology followed. The fourth, empirical section discusses and compares the transactions associated with three distinct approaches for waterway renewal. The article finishes with a conclusion.

## 2. A transaction-cost perspective on renewing waterway infrastructure

As a result of, among other things, decreased public funding, a growing competition for land and increased environmental awareness, public governments increasingly feel the pressure to generate more societal value from their infrastructure investments in waterways (Notteboom and Winkelmann, 2007). A wider involvement of other stakeholders may imply that governments have to move away from silo-based, hierarchically operating entities towards new organisation models in which multiple public and private parties can work together to their mutual benefit (Hijdra et al., 2014). For realising mutual gains, these parties have to look for potential combinations of goals to overcome differing, and sometimes conflicting, organisational aims.

In the field of transport planning (including port and inland waterway planning), new inter-organisational forms are being explored with broader stakeholder involvement, as seen, for instance, in increased public participation (Bickerstaff et al., 2002; Doms et al., 2013), the development of integrated evaluation tools (Haezendonck, 2007; Woltjer et al., 2015) and integrated forms of transportation and land use (Hull, 2008; Caris et al., 2014). Although the functional interrelatedness is herewith acknowledged, parties often still operate in an institutionally fragmented context (Buscher et al., 2015; Heeres et al., 2016). As a result, the planning of waterways can be regarded a “complicated multi-scalar and multi-actor affair” (Romein et al., 2003: 207). This suggests that a wider geographical scope has to be taken into account and, consequently, more stakeholders need to be included – both those in the vicinity of the waterway and those further away.

Producing agreements between stakeholders for attracting greater societal value from waterway renewal investments can be seen as transactions and, consequently, will lead to parties making transaction costs (Williamson, 1975). Transaction costs are considered a determining factor in how stakeholder involvement is organised (Alexander, 1992; Whittington, 2012; Hijdra et al., 2014). Affected parties have to be brought together and produce agreements assigning property rights. This entails the establishment of relationships, which involves coordination, such as getting to know the other party, gaining trust, coming to an agreement and subsequently enforcing this (Buitelaar, 2003). Consequently, there are costs for carrying out a transaction in addition to the actual production costs, which can be expressed in monetary terms, but also in time, energy or efforts (Hazeu, 2000).

Transaction cost economics (TCE) is the academic discipline that explains how transactions are coordinated based on an economic theory of organisation (Williamson, 1975). Williamson (1975) posits that actors have a bounded rationality, so they will make decisions with incomplete information and asymmetrically distributed information (Parker and Hartley, 2003). TCE assumes that parties are self-interest seeking and aim for a lowering of transaction costs (Williamson, 2000). For that matter, they will behave opportunistically, strategically taking advantage of the information asymmetries. Contracts between actors can therefore never be optimal in practice. Although TCE is originally developed for understanding private firms, its concepts can also be applied to public bureaucracies (Moe, 1984; Alexander, 1992). According to Williamson (1999a: 319), “the absence of ideal markets in private sector transactions is precisely the opening through which TCE made its entry”. In other words, private and public modes of organisation are often not “dramatically different” in practice (Moe, 1984:

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