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## Transport innovations and their effect on cities: the emergence of urban linear ferries worldwide

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### Abstract

Urban linear ferry systems are becoming an increasingly popular transport option for cities worldwide. These ferries stop at multiple destinations in a linear route configuration using high speed, high capacity vessels operating on a scheduled timetable, whereby adding to, and complementing existing public transport systems. This study seeks to provide the first international comparison of urban linear ferry systems, investigate why and how these systems have been implemented, and to explore how this innovation occurred. A set of predefined criteria was established and seven systems were selected for analysis: Brisbane, New York, London, Gothenburg, Copenhagen, Hamburg and Bangkok. The analysis was conducted in late 2014 and involved: i) a review of archival materials and reports for each location; ii) geographical information systems (GIS) mapping to compare route structures; iii) site visits; and iv) interviews conducted with key actors involved in the planning and operation of each system. A focus of the inquiry was why and how these systems were developed and the source of the innovations in each city. The study found that these ferry systems have been implemented for a number of reasons further to people moving, including economic development, tourism and city branding. The role of both private and government policy entrepreneurs was critical in explaining how the innovation occurred in each city. Ultimately, an understanding of the larger contextual role that ferries would play and the political championing of such systems helps to explain these transport innovations and the emergence of urban linear ferry systems worldwide.

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## 1. Introduction

As congestion in cities worldwide grows public transport expansion is seen as a necessary step to relieve pressure and provide opportunities for future travel demand. Many river and coastal cities are increasingly looking toward urban water transit solutions to facilitate this change. Regular, scheduled ferry services running linear routes stopping at multiple destinations (Thompson et al, 2006) using high speed vessels are becoming a popular configuration. Whilst that creates public transport opportunity in the city, these systems also offer other benefits such as activating waterfront land for urban revitalisation and creating tourism opportunities. Whilst these ferry systems are proliferating slowly there has been no systematic review of current operations worldwide. We do not yet know the reasons for system development. And we are yet to discern best-practice aspects of operation that could aid in the planning and design of new systems elsewhere. The emergence of fast linear ferries also provides an opportune case to explore and refine our understandings as to how innovations occur in transport planning. This paper seeks to help fill these gaps in knowledge. A diverse set of case studies are selected from North America (the East River Ferry in New York), Europe (similar services in London, Gothenburg, Copenhagen and Hamburg), Asia (the Chao Phraya Express in Bangkok) and Australia (Brisbane's CityCats). The paper uses innovation theory to provide understandings as to how such innovative modes of transport originate and the process of their implementation. The paper's contributions include the first comparison and benchmarking of these systems internationally, as well as conceptual advances in our understandings of how innovations occur in urban transport policy making.

The paper begins with a brief overview of past research on urban linear ferry systems and the justification for the chosen case studies. The paper then introduces innovation theory and how it may apply to the introduction of new forms of transport. The approach and methods of the study are then outlined. The results are presented, beginning with a comparison of system characteristics and a key summary table, with mapping of routes to allow meaningful comparison. Common themes that were found amongst the different cases are identified. Finally, the implications for transport innovations and how they may occur, as well the future of water transit and avenues for future research, are discussed.

## 2. Background

### 2.1. Ferry decline and re-invention

Aside from some unique examples, such as in Venice, linear transport ferries are a relatively new transport option for moving urban populations. Whilst ferry transport has enjoyed a long history of moving passengers across rivers (i.e. in New York across the Hudson River) most urban ferries have provided cross-river services only. With the emergence of bridges and tunnels many cross river ferries disappeared with the mode remaining in only isolated places, if not completely abandoned altogether in most cities (Cudahy, 1990). Locations away from the waterfront became more accessible when technologies such as streetcars and the automobile emerged which saw a retreat from waterfront locations and the growth of suburbia (Warner, 1962; Mees, 2009). However, since around the 1980s there has been a shift in urban structure in many cities. Ports moved downriver. Increased commercial, retail and residential waterfront development took place in inner cities. And there was a resurgence of interest in water borne passenger transport. There are a number of factors aiding this trend.

First was the global decline in port uses, manufacturing and warehousing in inner-city waterfront areas, assisted by the rise of "containerisation" (see Levinson, 2010). Upriver inner city ports were replaced by larger down-river facilities able to accommodate larger ships (Baird, 1996 p146-150). Inland industrial parks with no water access but strong rail and highway links became the norm. These shifts opened up inner-city waterfront lands for rezoning. With nuisance removed and a rise of knowledge economy employment in city centres, new gentrifiers shifted in and took up residence in re-developed waterfront dwellings and precincts. This revitalisation, based on residential and commercial repurposing, has occurred in the US, Europe and elsewhere (Baird, 1996 p150-152; Burayidi, 2001 p179).

Second was the active state promotion of and proactive planning by cities to reshape their image, restructure their environs and embrace the waterfront. Many cities began a conscious program of re-imagining themselves as "river cities", including London, Gothenburg and Brisbane. Incorporating river ferry services has been a part of this suite of reforms, helping create experience of the river and its advantages, and to stimulate waterfront redevelopment

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