

Innovation and transport planning: introducing urban linear ferries in Brisbane

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Abstract: Brisbane's CityCat ferries have become a successful fixture within the city's public transport system. The system has grown from an initial fleet of four catamaran vessels in 1996 to 21 vessels today. It features an urban scale, a passenger focus, regular scheduling, high speed vessels, a linear route configuration with multiple stops along the river and distinct branding and marketing. Cities elsewhere have since created similar systems. This paper uses innovation theory, derived from the product development literature to help explore how this innovation in the public transport market occurred. A focus was on the development of the CityCat system during the period between 1990 and 2000, a time of significant transformation of the riverine environment in Brisbane City. Six interviews were conducted with key actors involved in the planning and early operation of the ferry system. The results suggest that previous ferry operators with grounded local knowledge and strong economic motivations were central to the preliminary genesis of the concept, but that policy entrepreneurs in local government, harnessing the ferries to a planning agenda around a 'River City' and urban renewal were critical to the eventual packaging of what became the CityCats. The story of how the Brisbane system was developed, what influences were present, the planning process that were involved, and how the idea spread is instructive, and helps explain how and why transport innovations occur.

Introduction

As cities look toward how to best improve their public transport offering, a growing number are investing in urban transit ferries. These ferries run routes parallel to rivers using high speed vessels stopping at destinations along the river (Thompson, 2006) linking up key areas and operating closely with existing public transport modes. This operating model not only adds to the variety and capacity of public transport in the city, but contributes other benefits, such as facilitating economic development and tourism. This paper focuses on one example of these modern ferry transit systems, Brisbane's CityCats. It will explore the story of its emergence, from how the idea first arose from the previous history of transport on the Brisbane River, through to the progression to the current form of the ferry system and the effect it has had on Brisbane. The paper will also draw on the experience of other compatriot systems around the world and their paths in developing their systems. Innovation theory is used to frame the emerging themes identified in an effort to understand and suggest how experiences in transport innovation occur and the implications this has for transport planning. The CityCats are more than just a plan or policy; they brought a new product to the public transport market in Brisbane. As such, innovation theory is used in conjunction with planning theory to better help explain how this product was developed.

The paper begins by introducing this innovation theory and how it may apply to the introduction of new forms of transport. Second is an overview of the CityCat system in Brisbane and its current scope of operation and context within Brisbane's transport hierarchy. Following this is a description of the methodology used in the study. Next, the results are presented under themes that reflect the key factors that were identified as most influential in the development of the ferry system. Finally, the implications for transport innovation theory and the future development of urban ferry systems is discussed, with further avenues for research suggested.

Transport innovations

Innovation is generally seen as a process of learning, shaped by particular drivers and mechanisms (Mytelka & Smith, 2002, pp. 1467-1468). There are two competing views as to how this occurs: linear models of innovation, and systems-oriented models. Linear models conceive of research and development as fitting the frameworks of the applied sciences, whereby innovations begin with basic research and eventually transform through to real-world commercial products (Edquist & Hommen, 1999, p. 65). This may have some validity when considering the development of particular transport technologies. For instance, basic science on magnetic levitation led to the development of Maglev propulsion systems and eventually supply of infrastructure and vehicles for facilities such as Nagoya's Expo Line maglev system. But linear models of innovation fail to recognise the many feedback loops that occur as innovations come to fruition, including in product development and marketing. And they fail to understand the organisational and political factors implicit in transport innovations. Nagoya would

never have invested in maglev were in not for the political demands of officials hosting a World Exposition.

Systems-oriented models of innovation look much more at the demand-side of technology procurement. Actions of the state in procuring public transport involve a multitude of issues and often involve an iterative process of learning about vehicles, signals, track and related infrastructures. Systems-oriented models allow one to look beyond the simple process-based explanations for advances in technology, to explore the relations between actors, between systems, and the roles of rules, regulations, organizational norms and the like (Edquist & Hommen, 1999, pp. 65-66). Systems-oriented models are open to the ideas of planning theory. In this approach, institutions and lead actors, such as key transport bureaucrats or officials, become much more important in providing explanations for innovation. Also opened up are evolutionary explanations for technological innovation. Vincenti's insights into the role of not just technical problem solving, but also organisational factors, market disciplines and the profitability of firms in the development of retractable landing gear for aircraft is one example of the better explanatory power of such approaches (Nelson, 1995, p. 63). Feitelson and Salomon (2004, pp. 11-12) use a political economy approach to suggest that to be successful transport innovations must have technical feasibility as well as economic, social and political feasibility. And it is the incentives that decision-makers face, and the coalitions behind such innovations' that should be explored (Feitelson & Salomon, 2004, p. 11).

Brisbane's CityCats

Brisbane's CityCat system did something innovative in creating such a large, linear ferry system using high speed catamarans (shown in Figure 1). However, the innovation was not only due to the technology of the vessels per se. Nor was the innovation solely about using a linear route parallel to the riverbank – this has been done since at least ancient Egypt. The innovations were more in the overall packaging of the system: its design and management but also its conception within broader planning frameworks, and its branding and promotion within the city. Similar systems have since been developed in London, Gothenburg and on the East River, New York.

At the time of the CityCat system's development Brisbane's population was 1.3 million (ABS,1993) and the city already possessed a well-developed public transport system incorporating rail and bus services with dense coverage in the inner-city. The introduction of a ferry system added a further travel option within the city's public transport system. At that time all services, including the new ferries, were not particularly well integrated with one another. With the establishment of Translink in 2003, the network was unified under a zonal based structure with uniform fares across all modes. A smart card system, the Go Card, was introduced in 2008 to allow more efficient fare collection, with 90% of journeys now being Go Card journeys (Translink, 2015).



Figure 1: A Brisbane CityCat (Source: Matthew Burke)

The system now serves 25 terminals along a 21km stretch of river via a fleet of 21 vessels, with an end-to-end journey taking 76 minutes (Transdev, 2014). Operating hours are from 6am to 12am. A map of the system is shown in Figure 2. There are three different routes: firstly, the CityCat route runs the entire length of the river from the University of Queensland through to Northshore Hamilton using high speed (up to 25 knots) and high capacity (up to 168 passengers) vessels. Secondly, a set of cross-river routes are supplied at low frequencies by the CityFerry mono-hull vessels. Thirdly, a free CityHopper service provides a slower service within the inner-city areas, popular with tourists. The CityFerry and CityHopper both use smaller mono-hull vessels with a capacity of up to 80 and a top speed of only 15 knots (Transdev, 2014). While a relatively minor mode (2% of the total public transport share in Greater Brisbane) the system carries 8.1 million passengers a year and is a significant part of the overall public transport offer, particular servicing key markets such as central business district (CBD) commuters and university students (Soltani et al. forthcoming). It has continually expanded its network with recent new vessels and terminals. But how and why did Brisbane effect this overall innovation? And what can it tell us about how transport system innovations occur?

Methodology

In this investigation the focus was placed on the period from 1990 to 2000 when the initial CityCat system was proposed, designed and implemented. An archival review was conducted of available documents, images and other material from the period. This included concept proposals to council, officially commissioned planning studies and patronage forecasting, as well as impact assessment studies on anticipated effects on the river environment. A selection of six key actors in the planning process was then identified to participate in interviews on their role in the development of the CityCat system. The sampling frame included participants in local and state government, private consultants and also the private contractors responsible for the initial operation of the system. Those interviewed included a former Lord Mayor, a former councilor and head of Brisbane Transport (a Division of the Brisbane City Council bureaucracy), a senior council bureaucrat, a leading transport consultant, and proprietors of two private planning consultancy firms who were engaged to produce planning and feasibility studies for Brisbane City Council. These participants are listed in Table 1. The CityCat system was primarily planned and implemented within local government and the sample is therefore relatively representative. However there is one key limitation. The march of time has meant some key actors have moved on. Despite many attempts no interview was able to be conducted with the operators of a previous, more limited, ferry service on the Brisbane River. As such, the available data is less than desired on the development of the CityCat concept prior to the engagement of council.



Figure 2: Brisbane's current ferry network (Source: adapted from Translink, 2014)

| Participant | Role |
|-------------|---|
| LC1 | Former Lord Mayor of Brisbane |
| LC2 | Former head of Brisbane Transport |
| LC3 | Senior Brisbane City Council bureaucrat |
| PC1 | Public transport consultant |
| PC2 | Transport consultant |
| PC3 | Private consultant |

Table 1: Interview participants

A semi-structured interview format was used to allow respondents to tell a narrative of their experiences in the first instance, with questions and prompts used to guide discussion and allow for consistency and verification. Interviews were conducted in a combination of in-person and phone interviews. Responses were recorded and partially transcribed reflecting identified themes. Respondents were primarily involved in either the initial stage of idea conception, or responsible for developing the concept through to implementation with interviews structured accordingly. Manual coding was used to identify and theme the data into the categories that follow. Field investigations were undertaken on the CityCat system in 2014 and 2015. Similar interviews and field investigations were undertaken in London, New York, Gothenburg, Stockholm, Hamburg and Bangkok in late 2014. However, we only draw on these materials at key moments, to highlight comparative experiences, concentrating instead on the Brisbane example.

Results

The study found that at every stage of the planning process there were key actors that were critical in the progression of the CityCat concept. The sequence of events is critical to understand and was summed up neatly by one participant as: “the idea, the bureaucrat, (and) the politician” (LC2). Firstly, a pair of entrepreneurs with marine experience formed the initial idea of a linear style catamaran service along the Brisbane River. Secondly, local government bureaucrats harnessed the potential of the idea, giving support and progressing the concept by allocating resources and commissioning planning studies to build a stronger case. Finally, the need to win government-wide support for implementation was achieved through the Lord Mayor who “knew a good idea when he saw one” (LC2, 2015). One thing to note is that many of the participants rushed to claim ownership of the success of the system for themselves. Not always were these claims corroborated by others, but in general all the key actors involved played an important role at some point. Teasing out exactly who made key innovations, at what times, and the level of their creativity, was pointedly difficult. Following is a mostly chronological description of the processes involved, exploring key themes that were observed.

1. The emergence of the idea

Critical to the first seeds of the CityCat concept was the influence of those “on the water” who had the initial idea to update and replace the existing fragmented cross-river and single destination ferry services into an expanded and unified public transport ferry system (Brisbane City Council, 1993). Beginning from the mid 1960’s Brisbane had a privately operated river ferry, the “Golden Swan” ferry service later branded as the “Golden Mile” operating from Hamilton up river on the east side through to a terminal in St Lucia on the west (Brisbane Transport, 1993). A cross river service from the University of Queensland to Dutton Park was also privately operated. Five other cross-river ferries were also in operation across the Brisbane River with a total of 9 separate ferry services operating, as shown in Figure 3. The system was not particularly efficient, with many services operating with high passenger subsidies (Brisbane Transport, 1993).

The Golden Mile service operated up until 1991 when losses forced its closure (LC3, 2015). The proprietors at the time, River Connections, foreseeing an imminent demise under the previous operating model proposed a linear system unifying the existing ferry services, as they saw the potential for growth in passenger patronage and future success if the system was reorganised. “They (River Connections) came to us with the idea and Neil Cagney (then a key Council bureaucrat) and I worked together to build a case for it” (LC2, 2015). The motivations for the operators were relatively clear – innovate or perish. Were existing services profitable the CityCats might never have been conceived. The previous operators developed this notion of cross-river services being subsumed into a linear route that also offered cross-river options. Owing to recent technological advances these were to be serviced by newer low-wake, high speed catamarans.

This conceptual idea received preliminary support from key councillors and a tendering process began for concepts and proposals to operate a new form of service. This first tender was won by River

Connections, whose initial ideas were part of what was eventually implemented (and formed part of a later operating contract won by Transdev in 1997, who continue to operate the CityCat service today). The importance of those involved in the day-to-day operations of the previous ferries and their identification of the potential for a restructured system was therefore critical in pulling the first concepts together and placing them within the public arena. Interviewees felt they were onto a good idea: “they were a private company there to make money so...they knew it could work” (LC2) and that they were “best placed to provide that operator knowledge and insight (PC3, 2015).

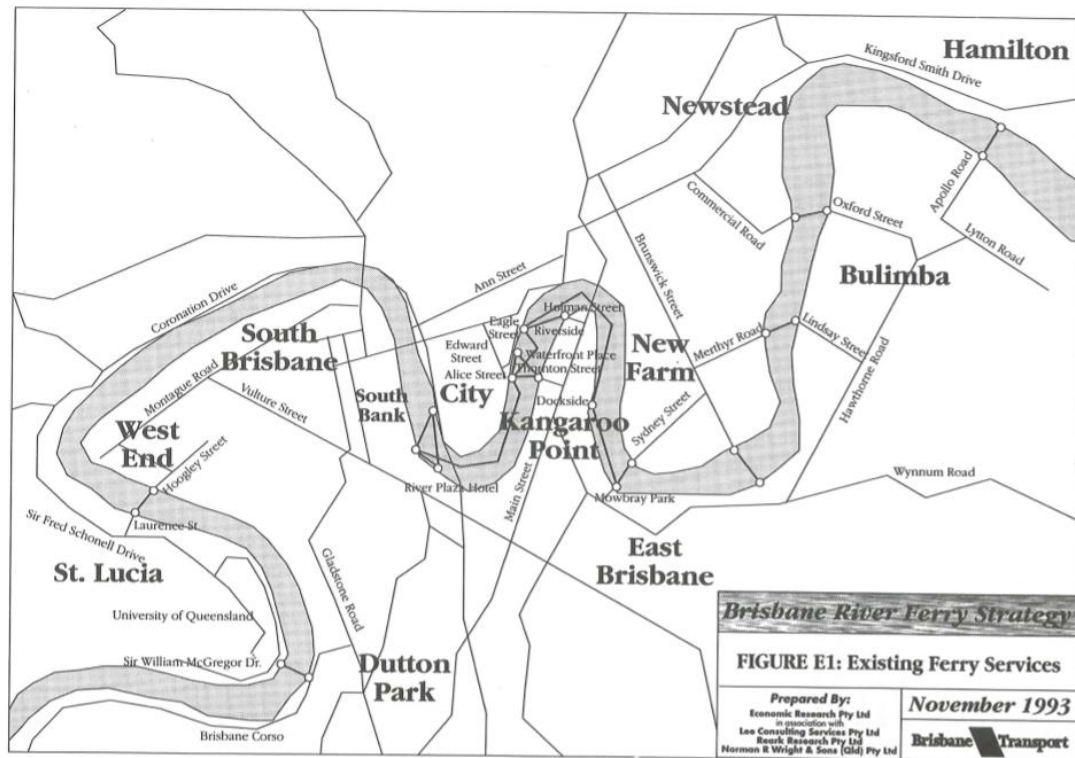


Figure 3: Ferry services prior to the CityCats (Source: Brisbane Transport, 1993)

2. Sharing a vision and communicating it effectively

The role of key bureaucrats in the CityCat’s development was critical from this point. It took “an imaginative and forward thinking bureaucrat in Neil Cagney”(LC2, 2015) who picked up the idea and ran with it. Within Brisbane City Council this support gained momentum and others were won over in what became the emergence of a shared vision. There was a growing belief that, if implemented, linear ferries could work in Brisbane. Support from local councillors and the bureaucracy as a whole followed, due in part to the way in which the project was communicated to others, and allowing those to take ownership. One participant noted “I think (a shared vision) occurs when a project is bigger than yourself” (LC2, 2015). In this way, the Councilor who was Chair of Brisbane Transport and her lead bureaucrat clearly took on the role of policy entrepreneurs (Feitelson & Salomon, 2004, p. 16), shaping and promoting the CityCat concept and developing the idea with expert consultant support (PC1 and PC2, 2015). Through this support the idea gained legitimacy as planning studies and expert reports were produced on topics such as terminal locations and design, vessel design, riverine ecosystem impacts and modelling to predict future demand, all pointing towards feasible options (Brisbane Transport, 1993).

The support of these studies turned out to be critical in fulfilling the next requirement which was the need to promote this vision and co-opt others (Innes and Gruber, 1995). The importance of building a strong case was highlighted as critical as the Lord Mayor was renowned for the “uncanny ability to see flaws in an idea, so preparation was really important” (PC1, 2015). This supports the idea that a political champion is needed in transport infrastructure investments and the important role they play (Tanko and Burke, 2015).

There was much discussion from the participants about the level of creativity that emerged at this part of the process. There was a need to be creative and adaptive given off-the-shelf expertise in what became known as linear ferry operations did not exist in Australia at the time. They were in many ways pioneering a new approach to the problem. As one interviewee noted: "...we didn't know about these ferry systems, (we) had to use our best knowledge to implement a solution that fit (PC2, 2015)". Another found the task to be positively liberating "it was new territory. We could be iconic and provide world's best practice" (PC3). These are big claims but there was ambition by the actors involved, and they certainly saw themselves as doing something on the cutting-edge.

One issue that did cause them serious technical and political risk was erosion. The large mono-hulled vessels of the past were causing considerable erosion to the riverbanks and there was understandable concern from residents that this would be increased with faster catamarans (LC2, 2015). However at this point technological advancements were converging that were favourable to the project. So important were the new low wash vehicles coming on line just in time, that "if they (River Connections) had come to us 6 years before with this we'd have to have said no" (LC2, 2015).

The role of technical appraisals prior to any commitment to the ferry system is in contrast to the decisions regarding the development of Brisbane's busways, which happened at a similar time in the city's history. In a study on the similar implementation of the Busway system it was found that technical rational analysis was only used to support a decision that was already made (Tanko and Burke, 2015) rather than to help in decision-making as in the ferries. This is partly explained in their being only one level of government involved in the CityCats development, and their being almost entirely a local government decision (they continue to be managed at the local level), whereas the Busways were built and continue to be managed by the Queensland State Government (LC3, 2015).

3. To see, experience and support

Progressing the idea from the initial proposal, through to bureaucrat and councillor support, to finally mayoral support involved a translating of the knowledge that the idea would work to those in government to influence their decision. Local councillors were confident in the idea, but providing first-hand experience to the Lord Mayor of similar ferry systems was a key contributor to the final decision. At the time the CityCats had few exemplars to draw on. The Grand Canal in Venice is a very different context with a slower speed. However, there was a service operating on the Parramatta River linking to Sydney's CBD. A field-trip was arranged, which may have been the key deciding factor to implement the CityCats: the former Lord Mayor recalling he thought: "why don't we have these things in Brisbane" (LC1, 2015), upon seeing and riding the Parramatta service first hand. This highlights the valuable role that the planning field-trip continues to play in the evolution and development of transport innovations (Tanko and Burke, 2015)

4. Changing mentality, risk taking, and city branding

Risk taking was a necessity for innovation to occur in this case. In order to take this risk though, it was observed that an inner-belief that the city needed to (re)develop allowed for calculated risk taking. In Brisbane this transpired after having experienced change in the identity of the city in the late 1980's. Interviewees repeatedly mentioned the role of the 1988 World Expo in Brisbane as a watershed moment that changed how the city saw itself forever (LC1 and LC2 2015). It gave the city the confidence that it could compete on the world stage, and significantly, the confidence to be a leader to forge forward with an untested idea. "After Expo there was a change in how people thought about Brisbane" (PC2, 2105). There was a new openness to the river itself and for habitation along it. But the whole ferry system concept was largely untested. Except for the Sydney example there existed little evidence that the vessels could work in the Brisbane context if packaged in the way being conceived. Initially "we didn't even know what these things looked like" one of the consultants involved offered (PC2, 2015). What helped this risk-taking was a low-cost, small scale roll-out for the preliminary system. Only four vessels were launched initially, offering relatively low frequencies, and only a modest number of cheap terminals were constructed, using spud-barge designs that proved problematic in the 2011 Brisbane floods. The low-costs were counter-weighed by multiple benefits, which was perceived by the interviewees as a contributor to its success (PC2, 2015). The system has continually expanded since, with new vessels, new terminals and terminal upgrades.

In addition, there was a campaign led by the Lord Mayor, to change the conception and branding of Brisbane into a 'river city'. As the former councillor suggested, "At the time people didn't even know that we had a river" (LC1, 2015). City branding is today commonplace but at that time it wasn't as well

formalised. The CityCats fit well with this vision, complementing a suite of river orientation and city modernisation plans. The former Lord Mayor noted he had a vision to rethink the city and “the ferries were one of things in a suite of changes that were aimed at highlighting the resource of the river to the everyday resident” (LC1, 2015). And in many ways “the CityCats became the very public face of this ideology, with their visual presence unsurpassed” (LC2, 2015).

Significantly the CityCats were also seen as part of a wider transport and land use ‘solution’, and not just as a basic transport operation. Their link to land development was understood early on. “Importantly we had a land use planner on board immediately, a service designer immediately and it was part of a transport solution designed not just to be a transport solution but a land use solution as well” (LC3, 2015). It is notable that the CityCats provided the first high-quality public transport services to inner-city sites such as New Farm, which were part of extremely successful urban renewal programs that have further promoted the river lifestyle, and which have since leveraged over US\$4 billion in private urban investment (Tsai et al. 2014).

The branding of the vessels themselves and the overall system, as the CityCats, became part of the overall implementation plan and part of the innovation that the system became. With their modern designs and distinct new Brisbane City livery, the vessels helped raise the population’s views of what river travel and indeed public transport could be like. Many interviewees fondly reminisced the first day of operation where the City Cats passed under the Story Bridge, the city’s great historical icon believing that they may just be part of creating something of a new icon. It is notable that other urban river ferry systems that have followed Brisbane’s path have also generally branded their system in similar ways, such as the Thames Clippers in London.

5. Experiences elsewhere

Though we focus this paper on the Brisbane case, investigations recently completed on systems elsewhere in the world (Tanko, forthcoming) showed often similar trajectories in how cities came to adopt linear river ferries. That research used similar interviews with actors in London, Gothenburg, Copenhagen, Hamburg, New York and Bangkok. In London, the critical influence of those directly involved working on the river was central to the coalitions that emerged there to first present and then win over support for the development of the Thames Clippers. In New York it was a similar policy entrepreneur in Mayor Bloomberg who championed the East River Ferry, also in part to stimulate urban renewal and a refocusing on the river. The branding and marketing of the ferries in Copenhagen and Hamburg is also much like that in Brisbane, attempting to become part of city iconography. Though space prevents us providing detail, the Brisbane CityCat product development sequence has many parallels with those of similar systems elsewhere. Certain key ingredients seemed to be important for ferry transport innovation to emerge.

Discussion

The Brisbane experience highlights the validity of using systems-oriented approaches for exploring transport innovations. In the case of the CityCat system a “leap of creativity” (Mascitelli, 2000 p 181) was required that deviated from a continuous development path into a discontinuous path (Veryzer, 1999 p306-308). The CityCats were innovative in the use of high-speed vessels for urban public transport, on a linear route, connected to the broader city public transport system, to stimulate urban redevelopment, and to provide iconic tourist experiences. While elements of these had been used previously, the overall packaging of the CityCats was a major break from the past and a leap into the unknown for the city’s transport managers. This was not a logical progression from what existed before.

The disparate contribution of many key actors meant a process of feedback and learning at each stage of the concept’s development, from first concepts, to refinement through technical enquiry, to the point where the system was launched. Perhaps a critical component to the story – and something of an accident – was the lack of an established expert in ferries within the council bureaucracy. This meant an openness to new ideas, the involvement of more actors than just the transport bureaucrats, and it meant a need to design on the fly. The economic situation of the previous operators provided motivations but the council officers and consultants shaped and reshaped the vision of what the CityCats could be through processes of technical enquiry and engagement with stakeholders and decision-makers. The Brisbane case showed the value of including actors such as land use planners within these processes, which helped them obtain more than just a new transport function.

Another key insight deriving from this analysis illustrates that, as is common in many fields, persons on the 'front line' who understand potentialities and are well placed to develop and proselytise these ideas can be critical to helping bring on innovations like Brisbane's CityCats. A large part then of the iterative process involved contribution from those with first-hand experience. Veryzer (1999) suggests innovators may gather this tacit knowledge from most fundamentally "learning by doing", but also those whose tacit knowledge is "gained through a combination of formal education and work experience in his speciality" (Veryzer, 1999). The two existing ferry system operators of the Golden Mile service responsible for bringing this idea firstly to Brisbane City Council were experienced enough to provide this critical knowledge. "They (River Connection) were what you might call practical people, and that's what you need to have..." (LC2, 2015).

The Brisbane case also seems to show how grounded local knowledge can be combined with outside perspectives and evolutionary adaptation of systems elsewhere (Nelson, 1995, p. 63). It is possible to see evolution from Sydney's limited low-frequency Parramatta catamaran service, to Brisbane's more intensive inner-urban system, to the ambitious systems more recently put in place in the East River, New York and on the Thames. This evolutionary pattern exists across both time and space, and replicates in some small way the evolutionary patterns across the world of the early railways and the early freeway systems (Jones, 1989). And, as noted earlier, the planning fieldtrip and experiencing a similar system remains important in both conveying ideas to and influencing key decision makers effectively.

This study found support for Feitelson & Salomon's (2004) contention that economic, social and political feasibility are all prerequisites for innovation. The economics of the previous ferry operations were fraught, but one interviewee said it would have been socially unpopular to completely remove them (PC2, 2015). Considered-risk taking emerges in such situations. For the local government there were possible benefits that outweighed the costs, particularly if inner-city renewal took off in Brisbane. The value of the CityCats to this agenda has been given evidentiary support with recent research suggest an 8% increase in property values as one travels to the terminals from 2km away (Tsai et al. 2014). In total it is believed that around \$4-5 Billion has been accrued from all of Brisbane's urban renewal in the inner-city, of which the CityCats were a modest part. Similar effects have been found elsewhere, including in New York around the East River terminals (New York City Economic Development Corporation, 2015). Politically, the CityCats were a neat fit for the agenda of a Lord Mayor, and were likely a popular policy measure – unless that is they proved an expensive flop.

The role of policy entrepreneurs within the bureaucracies appears significant, as in the case of Brisbane's busways (Tanko and Burke, 2015). Further, the CityCats fit perfectly well within the sanctioned discourse of the Soorley administration, which was attempting to re-imagine Brisbane as a River City, and to look to the river as a leisure and amenity resource. Indeed, the ferries became one of the most visible measures to assist the city in that repurposing. Other Australian cities absent of such narratives about their rivers (the Gold Coast, Perth) have not moved forward with linear ferry proposals. But as our ongoing international research is demonstrating (Tanko, forthcoming) cities who have gone through strong re-imaginings like London and Gothenburg have.

A limitation of the research is that it did not explore innovation that occurred with the ferry system in more recent years. The ferries continue to face challenges, and further innovations were required particularly in terms of terminal design and equipment after the 2011 Brisbane flood events, when many terminals were destroyed. Vessel designs have also changed to increase both total capacity and especially the standing areas outdoors, which are popular with passengers. Changes to stopping patterns and timetables continue. These could be explored further. Future research on transport innovations using combinations of innovation theory and planning theory could also be helpful in exploring the growth of new ride-sharing services in cities where it is being proactively encouraged, the introduction of bike-sharing systems in different urban contexts, and other new transport modes emergent in cities.

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