

# Exploring the performance of road pricing implementation factors – implications for Melbourne

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## Abstract

Road pricing is becoming a widely debated transport reform policy internationally. Many claim that road pricing has widespread benefits; contributing to a more efficient use of the road network, acting as a sustainable revenue source in the face of a declining and outdated fuel excise tax and advancing fairness and equity when it comes to accessing the road network. It is unclear how practical and implementable this transport policy is to the context of the city of Melbourne, Australia. This paper explores the specific factors in government, cities, people and policy that lead to successful implementation of road pricing. This was conducted through analysis of three successful road pricing schemes (London, Stockholm and Oregon), two that are in the process of road pricing implementation (New York & Hong Kong) and one city that experienced failed implementation (Edinburgh). These case studies were assessed based on their performance of a series of implementation factors. Overall results suggest that implementation factors such as having clear objectives of road pricing policy were of significant importance to successful implementation compared to context factors such as urban and geographic form which did not seem to influence successful implementation as heavily. A study of Melbourne was also included in the assessment. It concluded that Melbourne was not prepared for the immediate introduction of road pricing reform, rather, well placed to begin a journey towards implementation. The paper concludes with a series of policy implementation principles for Melbourne as a solution to increase its performance of implementation factors into the future.

## 1 Introduction

The objective of this research is to understand the factors that contribute to successful implementation of road pricing and to develop key implementation principles for Melbourne, Australia which is exploring the idea of road pricing. There is a significant amount of literature that analyses the benefits of road pricing in cities around the world. They promote road pricing as a means of achieving a more efficient use of the road network, a sustainable revenue source and a method to manage congestion and demand on the road network. Some literature explores the influences and lessons learnt from the successful or failed implementation of road pricing schemes (Santos and Fraser, 2006, Rye et al., 2008, Borjesson et al., 2012). However, there are very

few papers that approach the implementation issue with an analytical lens and synthesize these international experiences into a range of comparable criteria, especially when applying these criteria to the context of Melbourne. This paper does not focus on demonstrating the effectiveness of road pricing and quantifying the benefits, but rather, it addresses the question: what did each implementation factor do to influence the final outcome? The answer lies with a wide range of international road pricing implementation studies, drawing from government reports, policy discussion papers and technical journals in order to draw connections between schemes and comparatively analyse what influenced implementation success, and what led to implementation failure.

This paper is structured as follows; firstly, an outline of the general approach to the research is presented. Then each international case study is introduced, relevant experiences discussed, and an assessment is provided on the unique perspective each case brings to the implementation perspective. This is followed by an analysis section where a synthesis of the major implementation factors are presented. The implications of these factors in the context of Melbourne are then outlined and contrasted with success and failures of implementation factors in other case study cities. The paper concludes with a discussion of implications for policy and future research.

## **2 Approach**

The research aims to isolate the performance of individual road pricing implementation factors on the success or failure of road pricing proposals in a series of cities. The status of these factors in Melbourne is then considered. A case study methodology is adopted; this identified factors affecting implementation in each city. It assessed how many implementation factors were present and how influential they were in each city. A clear limitation with this method is that the paper may only comment on published material. However, as active road pricing schemes (as well as proposed schemes) are relatively limited around the world, many have multiple sources of commentary, often sharing a similar view.

At the core of the analysis is the synthesis table (Table 1), which is developed from the most prominent implementation factors across all case studies. The methodology identifies these factors which are then scored out of a maximum of 4 for each case study. High scores are better i.e. leading to a better chance of implementation. Scores are based on a comparative analysis between the case studies and are determined by an assessment of how well each city or state performs for each factor. In addition, each factor is weighted based on their relative importance to creating successful implementation outcomes. The specific weighting of each city is determined as follows; all evidence and literature around each case study is reviewed, followed closely by a comparison of all the factors that influence successful or unsuccessful implementation for each city. In most cases, factors associated with the highest weighting were identified as they were consistently the highest performing amongst the successful case studies. Ultimately, these scores and the weights are determined by the authors using judgements based on what the published literature suggests. The main purpose for including the criteria weighting in the synthesis table was to account for the fact that not all criteria identified contributes equally towards successful implementation of road pricing. If weighting across all criteria were to be equal, results could become skewed where case studies are heavily penalised or unfairly awarded for less

influential implementation factors. While this approach is subjective in nature, it is based on published evidence.

From the Melbourne case study, the case for implementation of road pricing in Melbourne is assessed based on a scoring of each implementation factor. Again, some degree of subjective judgement is adopted however this is also based on the published literature as well as the judgement of the authors' own understanding of the policy and political context of Melbourne where both authors are based.

### **3 Case Studies**

#### **3.1 Selection rationale**

Case studies analysed in this paper were selected based on the relevance of their road pricing implementation factors and the lessons learnt from these experiences. A range of successes, failures and schemes currently under development have been captured. London and Stockholm cases demonstrate the challenges towards successful implementation of cordon pricing schemes while Oregon highlights the successful implementation factors of a state-wide distance-based charge (Santos and Fraser, 2006, Eliasson, 2014, Oregon Department of Transportation, 2017). The Edinburgh cordon scheme is a useful case of an unsuccessful implementation of policy to draw lessons from and compare with successes of other cities (Ison and Rye, 2008). The ongoing road pricing implementation processes in Hong Kong and New York City also provide good context and perspective of present-day challenges (Fix NYC Advisory Panel, 2018, Hong Kong Transport Department, 2019).

The progress of road pricing implementation in each of these cities is now discussed.

#### **3.2 London, United Kingdom**

While the current-day London Congestion Charging Scheme (LCCS) was implemented on the 17<sup>th</sup> February 2003, discussion around road user charges dates back to the 1964 Smeed Report, a report by a panel set up by the Ministry of Transport to tackle the costs of congestion in the UK (Ministry of Transport, 1964). Introduced by Mayor Ken Livingston, the LCCS is classified as a cordon model that for a one-off fee of £11.50 (AUD\$21.50), allows unlimited trips into and within the charging zone for the day. The charge operates on weekdays between 07:00 to 18:00 (Transport for London, 2019). The charging zone covers the "Central London" area consisting of the financial centre, government offices, Parliament as well as a major tourist and entertainment precincts including the Oxford and Piccadilly Circus and Trafalgar Square. The zone may only cover 1% of Greater London (equivalent to approx. 21km<sup>2</sup>) but includes the main congestion pressure points of the road network (Leape, 2006).

Since beginning operation, Transport for London states that the charge has delivered significant efficiency benefits from the reduction in traffic, highlighting congestion levels remaining at a similar level in 2013 as they were in 2003 (Transport for London, 2014). In relation to the efficiency benefits for public transport, a study of vehicle counts by Santos and Fraser estimate that prior to the implementation of a charge, 63.9% of people entered the cordon using non-chargeable modes, including bus, bicycle and motorcycle users (Santos and Fraser, 2006). This large share of commuters were one of the clear winners of the scheme, enjoying higher speeds and lower travels times without paying extra charges (Verhoef, 2008). This percentage of commuters who benefited without undergoing a disutility of increased costs or the need to make

alternative travel arrangements is commonly agreed as one of the approach factors influencing public and political acceptability that led Mayor Livingstone's success in overcoming the great implementation challenge of road pricing (Siemiatycki, 2004, Banister, 2004, Santos, 2008).

The London Congestion Charging Scheme, as suggested by Siemiatycki, became a global prototype for road pricing, generating interest in the transport policy space with London's "international élan to propagate a mythical representation for congestion charging" as a solution to road congestion (Siemiatycki, 2004).

### 3.3 Stockholm, Sweden

Road pricing was first introduced to Stockholm's commuters in the form of the Stockholm Trial in 2006. While initial reports show strong public resistance to the idea of a road pricing, the Stockholm Congestion Tax was reintroduced in August 2007 after the trial and a referendum demonstrating a significant shift towards public support of the new tax (Eliasson and Jonsson, 2011). The Stockholm Congestion Tax is classified as a cordon model which consists of 18 charging points located around areas of high congestion on the main arterials leading in and out of the inner city. Charges range from SEK 11 to SEK 30 (AUD \$1.65 to \$4.50) varying by time of day, with the most expensive charges occurring in the middle of the peak (Transport Styrelsen, 2019). Geographically, the zone covers most of the inner-city islands, approximately 35km<sup>2</sup>.

Stockholm, similar to London, also benefits from a city centre with good public transport supply and an existing high transit share (typically 60-65% of motorised person trips in and out are made by public transport); a major factor in facilitating the immediate and persistent traffic reduction results of around 22% across the cordon since implementation (Eliasson, 2014). Further assisting with public transit mode share, the tax was introduced along with prior public transport investment, including 197 new buses, 16 new bus lines, additional park-and-ride facilities along with upgrades to the existing underground metro system (Albalade and Bel, 2009).

The Stockholm Congestion Tax provides a unique perspective to study the implementation factors that influence the behavioural and attitude shifts of commuters towards the pricing policy. As highlighted by Jonas Eliasson, former director of the Stockholm City Transportation Department, the Stockholm case study post-trial gives insight to the "prerequisites to achieve acceptability *given* the public *is* familiar with congestion charges" (Eliasson and Jonsson, 2011).

### 3.4 Oregon, United States

The case study of Oregon may be an outlier as it analyses the state of Oregon, rather than its city- Portland; however, there are also vital implantation factors to consider as part of the Oregon Department of Transportation's road pricing scheme. Known as the OReGO Program, Oregon's road user fee is a distance-based scheme that charges commuters US1.7 cents per mile (AUD 1.5 cents per km) in an attempt to replace the current declining fuel tax revenue<sup>1</sup> and fund road related projects into the future. As the scheme is limited to 5,000 vehicles under current legislation, users receive credits

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<sup>1</sup> The Australian Federal Government has also been experiencing a similar fall in fuel excise revenue since the early 2000's (Infrastructure Partnerships Australia and Deloitte, 2013). This will be discussed in further detail in *Section 5: Road pricing applied to Melbourne*.

on their bill to refund the fuel tax which is payed originally at the pump (Oregon Department of Transportation, 2019).

The scheme was also heavily backed up by evidence, modelling and analysis, beginning in 2001 with the Oregon State Legislature establishing the Road User Fee Task Force (RUFTF) to examine future alternatives to the fuel tax. A series of pilots were then run, examining the technical, economic, political and financial success factors of implementing an alternative to the fuel tax.

While the city of Portland has embraced cycling and quality public transport services, the modal split in 2015 was still heavily car dependent at around 72% of journeys with the remaining 28% primarily consisting of public transport and active modes (EcoMobility, 2019). Across the state, the 2006-2007 Road User Fee Pilot found a 22% reduction in driving during peak periods (Oregon Department of Transportation, 2017).

Although the OReGO Program is based on a state-wide scale as opposed to the other case study cities, its relevance to this paper lies in the connections of contextual, fiscal and budgetary constraints that can be drawn with Australia's own road pricing and funding situation. Ultimately, the implementation factors towards the success of the OReGO Program are highly relevant to the Australian context<sup>2</sup>.

### 3.5 New York City, United States

The Metropolitan Transportation Authority (MTA) and its subways were declared by New York City Governor Andrew Cuomo in June 2017 to be in a state of emergency, largely caused by a frequency of delays and breakdowns from overcrowding and ageing infrastructure. Leadership was subsequently directed to produce a recovery plan for the deteriorating subway system.

As part of the 2018 *FixNYC* Advisory Panel Report, backed by Governor Andrew Cuomo, the New York City zone pricing program is proposed to begin operation in 2020 (Fix NYC Advisory Panel, 2018). The program would operate in similar practice to the London Congestion Charging Scheme, in the form of a cordon model. With a goal of reducing the number of motor vehicles on NYC roads and to raise revenue for public transport investment, drivers will be charged a once-off fee of US\$11.52 (AUD \$16.40) per day to enter the charging zone. The zone will potentially cover Lower and Midtown Manhattan with a northern boundary at 60<sup>th</sup> St, a charging zone of approximately 22km<sup>2</sup>.

Congestion charging is not a new or radical proposal as part of NYC transport plans. While being part of the Citizens Budget Commission in both 2006 and 2015, as well as a transport initiative of Mayor Bloomberg's *plaNyC* in 2007, the implementation of congestion charging however has never come as close as the current *FixNYC* plan (The City of New York, 2011, Citizens Budget Commission, 2019). It should be highlighted that *FixNYC*'s recommendations advise on a zone pricing program as part of an integrated suite of transport solutions in multiple phases. At the time of paper writing, latest updates on the plan were approved on the 1<sup>st</sup> April 2019 by the State Legislature as part of the state budget (New York State Assembly, 2019). In 2020, the

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<sup>2</sup> The OReGO Program Final Report (2017) bears exceptional similarity in pricing concept and approach to the discussion papers created for Australia's own road funding challenges (Bureau of Infrastructure Transport and Regional Economics, 2009, De Percy et al., 2018, Infrastructure Partnerships Australia and Deloitte, 2013, Infrastructure Victoria, 2016).

proposed zone pricing program is expected to reduce vehicles both entering the CBD during the day by 13% while generating a total annual gross revenue of US\$810 million (AUD \$1.15b). To put this amount into perspective, the operating and capital costs of the subway, as listed by the MTA (Metropolitan Transportation Authority) requires US\$714 million, US\$362 million and US\$310 million in 2018, 2019 and 2020, respectively. While this gross revenue would be enough to improve the subway system and deliver frequent and reliable services, boosting accessibility of the system, further research needs to be done to determine the amount of transit investment needed to make a significant difference in NYC (Phase One of the *FixNYC* Panel Report actually highlights this, stating the public transportation improvements for the outer boroughs and suburbs needs to be identified, the cost of this is currently unknown). The reduction in vehicle traffic is also expected to improve the quality of on-road public transport, with Manhattan experiencing the greatest decline in bus ridership, down 16% since 2011 and a loss of 100 million passenger trips over the previous eight years (New York City Comptroller, 2017).

While it may still be undergoing implementation, the New York City zone pricing program illustrates a suitable current-day scenario to analyse relevant implementation factors that have led to its success so far (while also acknowledging the failures of NYC's previous implementation attempts).

### 3.6 Hong Kong

Hong Kong is currently working on a 2019 transport strategy which will primarily see the implementation electronic road pricing (ERP) in the form of a pilot scheme (Hong Kong Transport Department, 2019). Based on a series of feasibility studies commissioned by the Transport Department, the preferred approach will be similar to the cities of London and Stockholm, creating a cordon model with a series of free bypasses, discouraging general traffic away from the inner-city roads (MVA Hong Kong Ltd., 2009). With government reports dating back to the 1980's, ERP has always been widely debated as a solution to road congestion and private vehicle use in the city (Hau, 1990).

The pure geographic context of Hong Kong has always lent itself well to road pricing, an enclosed territory with high density development and land use. However, while feasibility studies and reports have always been comprehensive, it seems that the public response and implementing context of Hong Kong has never been in an ERP scheme's favour. Along with the 1982 property market crash and as a consequence, a weakening demand for private cars, the first proposals of ERP also coincided with the initiation of the joint Sino-British declaration, where Hong Kong was to be handed over to China in 1997 (Hau, 1990). As ERP would be enforced by multiple CCTV sites located at each cordon boundary, such a proposal led to significant privacy concerns for residents.

As opposed to typically car-dependent cities, especially in their outer suburbs, Hong Kong experienced a mode share of 89% of all trips in 2009 taken using public transport (including 11% by taxi), compared to only 11% by car and motorcycle (MVA Hong Kong Ltd., 2009). Heavy taxation and registration fees also continue to play a role in managing vehicle usage in the city (Hau, 1989). From history, it seems Hong Kong has almost been too effective in dealing with congestion, creating its own implementation problem in past attempts; it should be noted that the earlier proposed ERP scheme was also being considered at a time of the opening of the Island Line route of the Mass Transit Railway and the opening of the Island Eastern Corridor. Both

infrastructure projects served to ease congestion, further exacerbating the perception that further congestion targeting proposals (like ERP) were not required (Hau, 1990).

Hong Kong's latest developments in ERP, as part of the '*Smart Mobility – Intelligent Traffic Management*' "multi-prong approach" (Hong Kong Transport Department, 2019) serves as another opportunity for the city's Transport Department to reassess the developing contextual issues of traffic congestion and community acceptance and learn from the implementation factors hindering ERP's previously unsuccessful attempts.

### **3.7 Edinburgh, United Kingdom**

Edinburgh's road pricing plans failed as part of its transport strategy due to public acceptability challenges and a referendum resulting in a majority 'novote'<sup>3</sup> (Rye et al., 2008). While there are lessons to be learnt from those successful in implementing road pricing like Stockholm and London, there is also significant knowledge to be gained from considering the implementation factors of failed schemes and how each factor contributed to the final outcome. Such was the case in the city of Edinburgh.

Triggered by fears of growing car-dominated commutes into the city from outside its administrative boundaries, The City of Edinburgh's scheme was to operate across an inner and outer cordon during weekdays. Trips across either cordon in the charging direction were a proposed maximum of £2 (AUD \$3.71) however, unlike the London Congestion Charging Scheme, no charge would apply to those driving within the one cordon or between the two cordons (Cain and Jones, 2003).

As part of the *Integrated Transport Initiative for Edinburgh and South East Scotland*, the implementation of the charging scheme was also integrated with a package of city and regional improvements including new tram lines, increased bus frequencies, increased road maintenance and road safety and transport accessibility initiatives (Transport Initiatives Edinburgh, 2002). The proposed scheme modelled for the year 2011 and compared with a 'do-nothing' situation was expected to reduce vehicles entering the city centre on a typical weekday by 30% and increase public transport ridership into the city centre by 22% (Rye et al., 2008).

While the development and analysis of the proposed scheme highlighted many benefits it could deliver, Rye and Ison both argue that the specific implementation approach, along with unfavourable governance set-ups were the ultimate implementation factors that led to the scheme's failure (Ison and Rye, 2008).

## **4 Results – implementation factors**

### **4.1 Introducing the factors**

Extracted from the case studies, common implementation factors have been determined. Listed as broad concepts, road pricing implementation factors include:

- Approach
- Context
- Policy Objective
- Governance and legislation

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<sup>3</sup> Results of the two-week postal vote from The City of Edinburgh Council found 74% of votes against the charging scheme.

- Behavioural influence
- Trade-offs

The act of successfully implementing road pricing is often reflective of the specific campaign and leadership *approach factors* that government pursues. Examples of approach factors include the evidence base used to support pricing, the types of organisations and advisory bodies in favor of pricing and the amount of political support and public campaigning that adds momentum in support of pricing. These approach factors of successful implementation are heavily influenced by the surrounding city's policy, transport and social construct, known as the *context factors*. These context factors may include a city's urban form influencing the adoption of a pricing strategy as well as the perceived status quo when it comes to the preferred mode of transport – is it a heavily car dependent city? Furthermore, a well-defined road pricing policy for a specific context also resonates clear *policy objective factors*. This policy objective factor considers how robust and clear the message for road pricing is, along with attempting to understand if public acknowledgement of using pricing as a policy solution actually occurred and how it was gained. From support of the above factors, decision-makers then go through the process of actual implementation, with success influenced by the *governance and legislation factors*. This factor begins to go into detail around the governance background enabling implementation as well as considering some of the recurring legislative challenges of road pricing – such as revenue hypothecation. The distribution impacts and effectiveness of a proposed or ongoing scheme are further analysed as part of the *behavioural influence factors*. This includes the distributional effects and monitoring of pricing schemes, often closely connected to arguments of fairness and concepts of shifting behavior due to pricing. The final implementation factor attempts to critique schemes at a holistic level, analysing schemes and their overall performance and balance of technical, political and economic success, along with attempting to identify the 'winners' and 'losers' of the schemes – the *trade-offs*.

These six implementation factors can now be applied as a lens when analysing each case study city introduced in the previous Section 3. A synthesis of implementation factor performance results has been provided in Table 1.

## 4.2 Implementation Factor Performance

Each implementation factor for each city is given a ranking from 0 (little/no performance) to 4 (high performance). This scoring system is based on the assumption that from close analysis of the case studies, the author is able to formulate an argument as to why one case study performs greater than another in a certain category and deserves to receive a higher score. All of these individual implementation factor scores with their respective weighting then contribute to the overall score of each case study, shown in the *Weighted Criteria Score* row towards the lower section of Table 1. The successful case studies are the strongest performers across most implementation factors with overall scores of 2.9 and above, out of a total score of 4. The unsuccessful case study scores below 2. *Approach, policy objective and governance and legislation factors* are the strongest amongst the successful case studies while the *policy objective and trade-off factor* scores seem to suggest a strong influence in causing the failure of unsuccessful case studies.



**Table 1: Authors' summary implementation factor performance synthesis table**

		Successful			Ongoing		Unsuccessful	
Criteria weighting	Implementation factors & description	London	Stockholm	Oregon	New York	Hong Kong	Edinburgh	Melbourne
		7.5%	Developing support for pricing through research, advisory bodies and technical reports.	●	◐	◐	◐	◐
<b>Approach</b>	10.0%	Public campaign approach.	●	●	◐	◐	◐	◐ <sup>4</sup>
	10.0%	Political leadership and support of road pricing.	●	◐	◐	◐	◐	○
<b>Context</b>	5.0%	Urban, geographic form and suitability of road pricing.	◐	●	◐	●	◐	◐
	7.5%	Balance between car-dependence and PT mode share (travel behaviour status quo).	◐	◐	◐	◐	●	◐
<b>Policy objective</b>	10.0%	Clarity and transparency of policy objective.	●	●	●	●	◐	●
	10.0%	Public acknowledgment and acceptance of pricing as a solution.	◐	●	◐	◐	◐	◐
<b>Governance and legislation</b>	5.0%	Performance and coordination of implementing agency and government bodies.	●	◐	◐	◐	◐	◐ <sup>4</sup>
	5.0%	Ease of legislative background for implementation (low legislative complexity).	◐	◐	◐	◐	◐	◐
	5.0%	Political / policy adviser support for hypothecation of road pricing revenue and improved PT	●	●	●	◐	◐	◐
<b>Behavioural influence</b>	5.0%	Well-considered distributional effects (fairness) and monitoring.	●	◐	◐	◐	◐	◐
	5.0%	Proposed / actual effectiveness of shifting behaviour.	◐	◐	◐	◐	◐	◐
<b>Trade-offs</b>	10.0%	Community acceptability – prior to full implementation	◐	◐	◐	◐	○	◐
	5.0%	Good balance of success (technical, political, economic).	◐	●	◐	◐	◐	◐ <sup>4</sup>
		<i>Weighted Criteria Score (out of 4):</i> 3.4 3.2 2.9 2.9 1.8 1.3 1.9						

**KEY**

High performance: ● Good performance: ◐ Average performance: ◐ Low performance: ◐ Little/no performance: ○

**4.2.1 Approach implementation factors**

Beginning with the *approach implementation factor*, London receives full scores in this section, testament to the work of the London Assembly (part of the Greater London Authority which publicly examines and scrutinises policies and programmes proposed

<sup>4</sup> These performance scores for their respective factors (which would be unclear without an actual example to review) are based on the first real-world test of road pricing in Australia - the *Transurban Melbourne Road Usage Study (Transurban, 2016)*

by the Mayor and Mayoral advisers), significant draft strategy consultation as well as the establishment of the ROCOL Working Group (Review of Charging Options for London) – an advisory group of technical experts (Government Office for London, 2000). By building on this wealth of knowledge, London’s Mayor at the time, Ken Livingstone was able to lead a highly engaged team at Transport for London to generate momentum required for a successful implementation; leadership that resonated with the community after acknowledging how Livingstone was prepared to place his political future at stake (Banister, 2004). A similar case in New York has also unfolded, with Governor Andrew Cuomo determined to leave a legacy of widespread public transport improvement with the city. In contrast to London and New York, leadership from Edinburgh’s implementation period remains unclear, hence the low scoring of these approach factors. Rye et al. highlight the concerns of a Labour politician (with Labour being in government at the time of the referendum) who states that there was even a lack of central government support for the scheme with the view that the Scottish Executive had “passed the legislation, and then walked away” (Rye et al., 2008). Another interviewee, a media expert, also highlights the lack of a strong political champion for Edinburgh<sup>5</sup>.

#### **4.2.2 Context implementation Factors**

For the *context implementation factors*, the strong performance of Stockholm, New York and Hong Kong suggest the typical island geography with intersecting waterways is used as a common road pricing boundary. London, New York and Hong Kong also have high percentages of public transport ridership and significant urban density. However, it seems that for the *context factors* listed in Table 1, this is one of the few implementation factors where high performance of these factors does not necessarily correlate to successful implementation. In the case of Hong Kong, it is argued that for a city with high public transport patronage and low car ownership compared with other cities, the anticipated benefits of congestion reduction due to road pricing would be less significant. In summary, the 2007 Feasibility Study conducted by the Transport Department stated that there in fact were “no arguments for introducing congestion charging in Hong Kong” (MVA Hong Kong Ltd. and Consulting, 2009). Recent developments however, have cited high levels of congestion in the Hong Kong core district and a need for ERP as the result of the road system reaching capacity (Hong Kong Transport Department, 2018). Perhaps it not the ‘passive’ context such as topography and public transport mode share that influences the implementation success, but rather, the ‘active’ context where the status quo begins to negatively influence liveability, such as disruptive congestion levels.

#### **4.2.3 Policy objective implementation factors**

Acceptability of transport pricing strategies is commonly argued as one of the greatest implementation challenges (Schade and Schlag, 2003, Link, 2003). The performance results of the *policy objective implementation factors* show that all cities that have successfully implemented or are on track to implement road pricing have high performance scores in clarity and transparency around the design of the scheme. It could be argued that this is one of the most important implementation factors as it

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<sup>5</sup> Again, opinion on this topic of leadership is unclear and not unanimous. Opponents of the scheme who were interviewed state that a certain Councillor for transport was identified as a champion (Rye et al., 2008).

influences acceptability and in turn, leads to successful implementation. Previous failed attempts in Hong Kong and Edinburgh score poorly in this section.

London's scheme targeted congestion, Stockholm was eager to reduce emissions and vehicles in the central city, Oregon was chasing an alternate sustainable source of revenue for transport funding and New York is attempting to recover a subway system in disarray. All of these successful cities have a clear message, one that is politically feasible and publicly acceptable. With such clarity and transparency behind the policy objectives of road pricing, the lure of wider audience appeal becomes clearer. The schemes can be sold to be attractive to a broad range of stakeholders from businesses who experience greater revenue due to less congestion, environmental groups who see decreased pollution and fewer cars on the road, economists and engineers who believe road space is best allocated based on a user-pays model and community and social groups who benefit from improved public transportation (Siemiatycki, 2004).

#### **4.2.4 Governance and legislation implementation factors**

These implementation factors generally operate in the background of road pricing reform. While public acceptability and its influence on implementation success relies heavily on the other five listed factors, the *governance and legislation implementation factor* is skewed further towards the political and legislative feasibility of reform.

London succeeded in paving the way for the LCCS with the 1999 newly introduced Greater London Authority Act, allowing the Mayor to have new powers in implementing road pricing within Greater London (Transport for London, 2007).

The Oregon Legislature paved the way for Senate Bill 810 to be voted on and signed into law by Governor John Kitzhaber allowing road pricing, permitting the OReGO Program to continue operation post-trials (Oregon Department of Transportation, 2017).

Even Edinburgh's proposed road pricing scheme had the Transport (Scotland) Act 2001 allowing any authority wishing to pursue a scheme the legal grounds to do so. The issue with Edinburgh, hence its low score in this implementation factor, was the complexity of the implementation legislation and processes. The City Council's local politicians are at the bottom of a three-tiered structure of elected politicians – as a result, local authorities such as the City of Edinburgh were still required to submit their road pricing proposals through a series of gates established by the Central Government (the Scottish Executive) who held power over the final decision (Rye et al., 2008). When put into comparison, the Mayor of London was able to act with a far greater degree of autonomy than The City of Edinburgh when it came to actively move towards road pricing implementation.

#### **4.2.5 Behavioural influence implementation factors**

The concept of 'winners' and 'losers' is often connected to road pricing policy – a scenario of attempting to classify the distributional effects and behavioural influences of reform. Cities with successful implementation perform highly in their recognition and response to distributional effects. This is one of the implementation factors where the alignment of political and public acceptance is strong. Citizen surveys towards road pricing across European cities suggest that people consider transport (both roads and

public transport) as a basic service to which they are entitled<sup>7</sup> (Link, 2003), an obvious issue when you begin to suggest that certain social groups fall into a ‘losers’ category. Is it possible to *sell* a scheme with no ‘losers’? We can use the New York case study for this, which performs well in this category. With the proposed congestion charge in place, census data suggests that only 4% of outer borough working residents use private vehicles to commute to jobs in Manhattan – approximately 118,000 residents. Of these residents, less than 5,000 qualify as the working poor. The *FixNYC* panel highlights that consideration should be given to those lower income commuters who have no other choice but to commute in vehicles, however, for the remaining commuters – public transport is greatly improved from investment paid for by the congestion charging plan. The panel then goes on to argue that “those who choose to highlight these [congestion charging] proposals as regressive also choose to ignore the facts” (Fix NYC Advisory Panel, 2018).

On a similar theme, academics and transport experts on the Stockholm road pricing scheme highlight that defining winners and losers becomes almost impossible over the long term. While it may be easy to identify short term losers as being drivers who have to pay more (although with better travel times), commuter behaviour and trip decision-making processes over a longer period change. This occurs as road pricing shifts from being an ‘external shock’ to simply a factor that is considered when deciding on residence, workplace and leisure destinations (Borjesson et al., 2012) – perhaps one of the reasons as to why the implementation of Stockholm’s road pricing reform was so successful over time.

Finally, the city that scores highest in the distributional effects and monitoring category, London, provides another perspective on the behavioral influence of the charges. Not only do a series of ‘*Impacts Monitoring*’ documents suggest the ongoing evaluation and performance measurement of the scheme and its influence on the number of trips across the charging zone, but they also suggest a solid consideration of the second order effects of changing behavior (Transport for London, 2008). This includes social impacts of the congestion charge like changed social interactions and the impact on parents and children as well as business and economic impacts. In terms of how the charge impacted businesses – amongst strong concerns expressed by retailers – Transport for London states that “the advent of charging does not appear to have adversely affected the retail sector [within the charging zone]”, in fact, outperforming retail in other areas of the city (Transport for London, 2008). Reports also suggest stronger rental growth performance within the zone, compared to performance prior to the introduction of pricing. It should also be noted that the implementation of charging would not have been the only influence of business and retail performance change and that the prevalence of other macroeconomic conditions and transport shifts could have influenced these results (Ernst & Young, 2006). Nevertheless, consistent analysis and reporting of a scheme’s wider impacts as experienced in London are a good attempt to show the true complexity and influence of road pricing policy.

#### **4.2.6 Trade-offs implementation factors**

One of the significant trade-offs experienced during road pricing implementation is the balance between acceptability and efficiency. While economists and engineers see improved efficiency of the use of road space through user-pays pricing, politicians see

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<sup>7</sup> The citizen survey incorporated responses of over 1300 individuals across Austria, France, Germany, the Netherlands, UK and Sweden (Link, 2003).

public acceptability as one of the major challenges to reform; a clear compromise is needed. In many cases, when this compromise is transparent and well-portrayed in the public eye, a similar narrative begins to form across the successful case study cities. As an example, many exemptions exist for the London Congestion Charging Scheme, a clear attempt to make the scheme as fair as possible (against original RCOL minimal exemption recommendations for economic purposes) and to ensure the public perceived the scheme being fair (Livingstone, 2004), hence the high score of this implementation factor. London Mayor at the time, Ken Livingstone argues that the open and responsive approach towards the public, especially around *trade-off implementation factors* such as exemptions as well as good promotion of the scheme ensured public support; even if it did originally receive hysterically negative media coverage (Livingstone, 2004).

Through further analysis of media coverage, we may begin to understand the influence of community acceptability on the successful implementation of road pricing schemes. In Stockholm, after the initial road pricing trial, Eliasson highlights the shift of media coverage from 3% of positive newspaper articles to 42%, a true case of “familiarity breeding acceptability” (Eliasson, 2014). In contrast, as the referendum for Edinburgh’s road pricing implementation approached (noting that Edinburgh did not undergo any road pricing trials), the media landscape was incredibly negative. Newspapers like the *Edinburgh Evening News* had three negative articles for every positive article, while *The Scotsman*, *Scotland on Sunday* and *The Sunday Herald* had more than two negative articles for every positive article, a likely influence of a negative referendum result (Rye et al., 2008), hence, Edinburgh’s low scoring of this implementation factor.

## 5 Implications for Melbourne

Similar to many of the successful case study cities, Australia also has a rich history of road pricing research and discussion. Melbourne scores an average 1.9 out of 4 in implementation performance.

In recent years, with road congestion and infrastructure debate a highly prevalent topic in Australia’s political context, numerous infrastructure advisory bodies, policy institutes and multiple government agencies at federal, state and local levels have been continuously pursuing road pricing reform (Infrastructure Victoria, 2016, Terrill, 2017, Bureau of Infrastructure Transport and Regional Economics, 2009, Infrastructure Partnerships Australia and Deloitte, 2013, Saberi, 2018).

Current political support in Melbourne remains low, while being part of Infrastructure Victoria’s 30-year infrastructure strategy, a transport pricing scheme recommendation was not supported by the State Government, nor the opposition. In contrast, transport pricing reform is highly regarded in principle by both Infrastructure Australia and features in the 2015 Competition Policy Review (Infrastructure Australia, 2016, Harper et al., 2015). As such, the *approach implementation factor* in Melbourne is left in a polarised state with strong technical and advisory support yet lacking the political leadership to implement.

The performance of the *context implementation factors* would depend on the specific design of a road pricing scheme. However, the geographic context of Melbourne’s CBD grid and inner suburbs, bordered by the Yarra River, major freeways and arterial roads, is well placed for a cordon pricing scheme, similar to London. Preliminary demand modelling in Melbourne determined that 1 in 2 trips in the inner Melbourne area were in congested conditions (KPMG et al., 2016). As for a road pricing scheme

that extended further out into Melbourne's suburbs, as highlighted by the Grattan Institute, Melbourne is highly car dependent with 81% of travel made by car (Terrill, 2017). When compared to the mode share of London and Stockholm that have implemented road pricing, public transport dominates as the most utilised form of transport in these cities (60%-65% of travel made by public transport into their priced zones). Based purely on this car-dependent status-quo of commuting in Melbourne, caution should be exercised by government if attempting to follow in the footsteps of London and Stockholm.

Melbourne scores relatively well in the *objective implementation factors* section. There seems to be two clear objectives and incentives for reform in the city. The first, being rising costs of congestion as the trigger, emphasising the negative externalities and extra burden of AUD \$1,700 per year on every Melbourne resident as a result of a road network struggling to cope with demand by 2030 (Infrastructure Victoria, 2016). The second objective, similar to declining fuel excise revenue in Oregon, government at the federal level is clear in a need to reform road pricing in Australia. Infrastructure Partnerships Australia highlights this funding challenge of declining fuel excise revenue as a proportion of GDP from 1.69% to 1.16% over the 2002-2011 year period (Infrastructure Partnerships Australia and Deloitte, 2013).

One of the key issues of road pricing reform in Melbourne, as demonstrated by its low score, is within the *governance and legislation factors*. With a road funding model which is distributed between the Local, State and Federal Governments, road pricing reform requires significant cooperation from all levels of government. This misalignment of vision between levels of government and also the public can be captured through the example of hypothecation; earmarking revenue collected on the roads to go directly back to transport infrastructure investment. Early publications by the Australian Bureau of Transport Economics in 1985 (*Occasional Paper no. 73*) argue against the concept of hypothecation, highlighting the misalignment of the concept with economic theory (Ingham, 1985). In recent years, this factor of hypothecating revenue is again highlighted in BITRE's *Working Paper no. 74*, with warnings of the trade-off between improving public acceptability through hypothecation and the improper and inefficient use of funds it can cause (Bureau of Infrastructure Transport and Regional Economics, 2009). In contrast, advisory bodies and policy researchers at state and local level often use the concept of hypothecation more favorably in an attempt to gain public acceptability. As part of a community consultation period on transport network pricing conducted by Infrastructure Victoria in early 2019, the community panel recommended that if pricing were to be introduced, they would show support for revenue from transport to be spent directly back on transport (Infrastructure Victoria, 2019).

Similar to the *context implementation factors*, the *behavioural influence factors* also depend heavily on the type of pricing scheme applied to the Melbourne. Melbourne scores average in this category. If implemented poorly, especially in a CBD dominant city such as Melbourne, the distributional shock effects of generally less well-off people in suburbs with poor public transport alternatives need to be carefully considered with the implementation of road pricing – especially in the case of implementing distance-based charges, similar to Oregon. However, road pricing can also influence the time people choose to travel in an attempt to better spread demand on the road network over the course of the day. In a survey of over 200 Melbourne residents, 1 in 4 surveyed peak period drivers said that they could change their time of travel (Infrastructure Victoria, 2016) – in comparison, if put into practice, this is even greater

than the reduction of approximately 1 in 5 vehicles no longer entering the Stockholm road pricing cordon.

One of the largest trade-offs, as mentioned earlier in this paper, also found in the Melbourne context of road pricing reform is the balance between the effectiveness and acceptability. Results from a Melbourne road pricing pilot study have contributed to good performance score of the *trade-offs implementation factor*. Through the 2016 Transurban *Melbourne Road Usage Study*, the behavioural responses of over 1,600 motorists were able to be captured over a 17-month period (Transurban, 2016). While Stockholm also conducted a trial prior to full road pricing implementation, Oregon conducted a series of smaller pilots, improving public familiarity with the scheme and demonstrating the benefits through real-world experiences. The Transurban trial resulted in 60% of participants accepting and preferring new proposed road pricing models over the current system. In contrast, a survey conducted by the City of Melbourne on reactions to their road pricing found only 38% of respondents supportive of reform with another 41% sceptical about the feasibility of the ideas<sup>8</sup> (Ernst & Young, 2018). The question can be asked, if the sceptical 41% of respondents had the opportunity to experience the benefits, but also challenges of road pricing, would they shift their view – and could a swing similarly experienced in Stockholm, London and Oregon occur in Melbourne?

## 6 Discussion and Conclusion

There are significant road pricing implementation challenges facing Melbourne, along with building pressures calling for road pricing reform. The summary of findings from this research suggest that Melbourne is not prepared for the immediate introduction of road pricing reform. The city however, is well placed to begin a journey *towards* implementation of road pricing reform. If Melbourne can build on the performance of its poorer scoring implementation factors such as political leadership and its car dependence through complimentary policy and public transport investment, the city is well and truly on track towards a new road pricing era.

Melbourne is unique, and this paper cannot simply apply the implementation approach of its case studies as a series of recommendations for the city. What this paper can do is consider the experiences from other cities and answer the question, how can Melbourne improve on the most important implementation factors to successfully impact road pricing outcomes? The answers are summarised in a series of concluding principles in Section 6.1, specifically designed for Melbourne.

### 6.1 Melbourne road pricing implementation principles

**‘Why’, ‘What’, ‘How’** - Strong leadership and clarity of road pricing objective – the community must be able to understand the ‘why’ and share the vision of the ‘what’ in order to be able to support the implementation journey that is the ‘how’.

**Respect the context** - Ensure that implementing and development agencies associated with road pricing reform understand the political, geographic, transport and

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<sup>8</sup> This survey was conducted as part of the City of Melbourne Transport Strategy update (2018), from small sample size of 39 participants. However, larger surveys with over 150 participants conducted by Liu et al. suggest a similar result of 42% support of road pricing reform with a resistance rate of 38% (Liu et al., 2016).

social landscape and how the finer details of pricing can be used to influence positive outcomes.

**Package it together** - Road pricing will never work independently of wider transport policy. It must be integrated into wider transport strategy with revenue potentially contributing towards transport investment pipelines.

**Understand the impacts** - Distributional effects of road pricing must be analysed and acted upon to ensure equity and fairness during scheme development.

**Work together** - Strong co-ordination between levels of government for policy implementation; and coordination between transport portfolios and human services for public acceptability on transport disadvantage.

**Are you listening?** - The public must be taken on the journey of pricing reform development and implementation. We must ensure that communities have the opportunity to voice their opinion, understand gains and losses and have a perceived responsibility to do what is best for the city.

## 6.2 Conclusion

The road pricing discussion in Australia has gone on for far too long within the closed doors of government, the highly subjective views of economists and engineers and the multitude of discussion papers that continue to develop an endless momentum of calls for reform. It is time to take the debate into the public eye, respect their critique and perspectives to guide policy development and help our decision makers find a solution that is both politically palatable and publicly acceptable. A well-educated community is one that feels empowered; one that understands the benefits and the burdens of pricing and can decide on whether they wish to see implementation of road pricing reform a reality.

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