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Bridging the Last Mile? Evaluating the Role of Shared E-scooters in Australian Public Transport

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Abstract. This paper assesses whether shared e-scooters can address last-mile transport in Australian cities through a comparative case study of Sydney (NSW) and Brisbane (QLD). Using state legislation, municipal bylaws, licensing materials, and relevant literature, it analyses policy and regulation, service scale, public-transport integration, safety and perception, and long-term feasibility. Findings show that governance framing is decisive. In Sydney, short, tightly bounded trials and a ban on private devices limit scale, weaken first/last-mile links, and constrain evidence. In Brisbane, citywide operation under multi-year licences, backed by clear state rules and municipal controls, normalises use and supports iterative, data-led regulation, improving prospects for integration. This contrast highlights how differing legal and administrative approaches can produce distinct outcomes in service availability and public Distributional outcomes hinge on explicit spatial and pricing obligations; without them, access clusters in well-served areas. Station-area coverage targets, standardised data sharing and enforcement, and equitable pricing adapted to local conditions are recommended. The study highlights how legal and regulatory design shapes micromobility outcomes, offering lessons for sustainable urban transport policy.

Keywords: Micromobility, E-scooters, Last-mile connectivity, Urban transport policy

1. Introduction

Urban transport systems worldwide continue to face the persistent challenge of the “last-mile” gap. While public transport provides relatively efficient coverage for medium- and long-distance travel, a spatial disconnect often exists between the terminal station and passengers’ actual destinations [1]. This “last-mile” gap can result in inefficiencies such as longer travel times, reduced accessibility for certain communities, and greater dependence on private cars. In urban contexts, the long-term existence of this gap not only affects social equity, but also undermines broader goals of sustainable urban development and public transport integration [2]. Therefore, the last-mile problem is not merely a logistical issue; it represents a structural challenge related to social equity, urban environment, and mobility choice [3].

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Figure 1. E-scooter [4]

To address this challenge, micromobility has emerged as a promising solution in the contemporary urban context [5]. Among various micromobility modes, shared e-scooters offer a flexible, low-cost, and environmentally friendly alternative for last-mile travel [6]. Global examples illustrate the widespread adoption of micromobility solutions: Paris has integrated shared e-scooters and bicycles into its public transport network [3]; Singapore has adopted a regulated e-scooter program to support dense urban mobility [7]; and North American cities report significant reductions in car trips following the introduction of shared e-scooters [8,9]. Within this global context, Australian cities have cautiously begun experimenting with shared e-scooter programs, providing a timely opportunity to explore how micromobility can mitigate last-mile challenges.

Despite the widespread promotion of micromobility as an effective solution for first- and last-mile travel, its implementation outcomes vary substantially across cities and policy contexts [9]. In Australia, shared e-scooters represent one of the most prominent yet controversial forms of micromobility as shown in figure 1. Unlike bicycles—which have long been integrated into urban transport systems—e-scooters, as a relatively new mode, face unique challenges regarding safety, regulation, and public acceptance [10]. Moreover, the contrasting approaches adopted by Sydney and Brisbane, the capital cities of two different states, in managing and deploying shared e-scooters make Australia's experience particularly instructive for understanding the governance and policy dynamics of micromobility.

This paper will assess the impact of shared e-scooters in Australia through comparative analysis across four dimensions: policy and regulations, coverage, public transport connectivity, and social acceptance, as follows:

Core question: Can shared e-scooters effectively alleviate the "last-mile" problem in Australian cities?

The problem is divided into four questions as shown in Figure 2.

a. Under what regulatory conditions can the "last-mile" problem be most effectively mitigated?

b. Why do Sydney and Brisbane have differing policies?

c. How does this difference impact usage and social acceptance?

d. What insights does this offer for long-term development?

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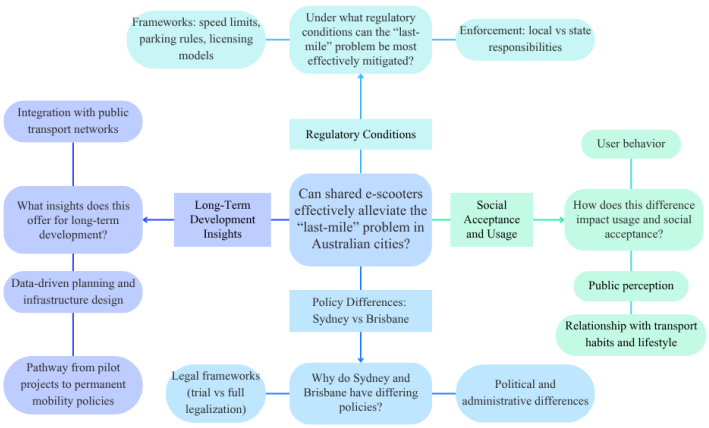

Figure 2. Organization of the study

This study aims to assess the long-term potential of shared e-scooters in Australia by thoroughly examining the broader feasibility of integrating micromobility into urban transport systems. It provides evidence-based insights for policymakers, particularly the New South Wales Government, when considering whether to expand shared electric scooter schemes. This paper aims to evaluate the impact of shared e-scooters on "last-mile" connectivity within Australian urban contexts, thereby supplementing international research by providing comparative case studies of policy experiments from a global south urban perspective. From a practical perspective, by comparing the policy and governance models of Sydney and Brisbane, this analysis highlights how regulatory influence service accessibility, usage patterns, and user safety, for transport planners, private operators, and local communities, demonstrating the practical role of shared e-scooters in enhancing urban accessibility and sustainability. This paper provides a basis for urban transport policy and explores the significant role shared e-scooters play within Australia's urban transport systems.

2. Literature review

2.1. Theoretical foundations of the "Last Mile"

The concept of the "First Mile and Last Mile (FLM)" has become a central theme in research on transportation and urban mobility. It refers to the gap between the nearest public transport stop and the traveler's final destination [11]—a distance that is too short for conventional public transport services but often too long or inconvenient to cover by walking. This disconnect has been widely recognized as a major barrier to efficient and equitable mobility. Inadequate FLM solutions can discourage the use of public transport, prolong travel times, and reinforce car dependence in low-density areas where transit networks are incomplete [12].

In both academic and policy discussions, the challenges of FLM are not only logistical but also deeply influence the accessibility, equity, and sustainability of urban transport systems [13]. For example, residents living in suburban or peri-urban areas with limited access to bus or rail services often bear disproportionate travel burdens compared to those in well-served areas.

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Traditional approaches to bridging this “one-mile” gap—such as walking, feeder buses, park-and-ride schemes, and bicycles—have faced challenges in achieving large-scale adoption due to cost, flexibility, and user convenience [13]. For instance, feeder buses in low-density regions often suffer from low ridership and high operational inefficiency, while park-and-ride programs may inadvertently encourage partial car use, thereby failing to reduce overall car dependence [13].

In recent years, discussions around FLM have shifted toward more flexible and user-centered solutions, notably micromobility, which offers a promising alternative. Shared bicycles, e-bikes, and e-scooters have been promoted as affordable, sustainable, and convenient tools capable of bridging the last-mile gap [14]. The widespread adoption of these modes across many cities demonstrates that the last mile is no longer viewed as an intractable obstacle, but rather as an opportunity to reimagine urban transport systems—enhancing inclusivity and advancing sustainability goals.

2.2. Micromobility in global context

Micromobility is defined as lightweight vehicles—purely human-powered or electrically assisted—with a maximum speed not exceeding 45 km/h, such as bicycles, skates, skateboards, and kick-scooters. In urban contexts, the most widely adopted micromobility modes include shared bicycles, e-bikes, and e-scooters [15]. Compared with traditional feeder services or park-and-ride schemes, micromobility offers a more convenient, cost-effective, and environmentally sustainable approach to short-distance travel.

Globally, several cities have demonstrated the potential of micromobility to transform urban mobility patterns. Los Angeles introduced shared e-scooters in 2017, and within a year they became the most popular micromobility option. According to the 2018 U.S. Shared Micromobility Report, approximately one-third of e-scooter trips replaced car trips [16]. In Paris, the launch of the Vélib’ bicycle-sharing system in 2007 enhanced accessibility and reduced car dependency. The city later introduced shared e-scooters in 2018 and began exploring their role as part of multimodal mobility services. In 2019, in response to issues such as street clutter, accidents, and pedestrian safety, the Paris City Council implemented behavioral regulations for e-scooter users [17]. Similarly, Singapore recognized the value of micromobility in connecting residential neighborhoods with public transport. Since 2013, it has promoted personal mobility devices (PMDs), including e-scooters, and in 2017 enacted the Active Mobility Act to formalize their governance [18].

However, these cities also faced similar challenges. As micromobility reduced car dependence and improved last-mile connectivity, the rapid and often unregulated proliferation of e-scooters led to urban congestion, disordered parking, speeding, and drunk or reckless riding [7,16,17].

In summary, micromobility has indeed contributed to the achievement of sustainable transport goals, but its success depends heavily on the regulatory framework, infrastructure design, and cultural acceptance. Comparative studies examining e-scooter implementation under different policy contexts provide valuable insights for Australian cities, particularly Sydney and Brisbane, as they explore their own approaches to shared micromobility governance.

2.3. Research on micromobility in Australia

Compared with international cases, research on micromobility in Australia remains relatively limited and fragmented. By 2024, all Australian states and territories had completed shared e-scooter trial programs [19]. However, significant policy variation exists between jurisdictions, and the divergent regulatory environments have directly influenced the deployment of shared e-scooters. The New South Wales (NSW) Government has consistently maintained a cautious stance, restricting shared e-

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scooters to designated trial areas, while the use of privately owned e-scooters on public roads remains illegal [19].

In contrast, Queensland—particularly Brisbane— has adopted a more open and permissive approach. Since their introduction in 2018, approximately 2,500 shared e-scooters have been deployed across the metropolitan area [20], and privately owned e-scooters are permitted on public roads, provided that users comply with age limits and basic safety regulations. The Brisbane City Council has also signed long-term contracts with operators, signaling the city's institutional commitment to integrating e-scooters into the urban transport system [21].

Although public interest in micromobility continues to grow, notable research gaps persist in the Australian context. International studies have documented clear reductions in car use and increases in public transport ridership, yet evidence from Australia on travel behavior change and modal shift remains limited. Moreover, the long-term feasibility of incorporating e-scooters into Australia's transport planning framework is still uncertain. A comparative analysis between Sydney and Brisbane thus provides valuable insights for policy reform and contributes to the broader academic discourse on sustainable mobility.

3. Methodology

This study adopts a comparative case study approach to examine the management and deployment of shared e-scooters in two Australian cities—Sydney (New South Wales) and Brisbane (Queensland). Through this method, the study provides a detailed analysis of policy frameworks, regulatory environments, and urban mobility practices related to last-mile transportation. Sydney and Brisbane represent two contrasting approaches to micromobility: one based on limited government-led trials, and the other characterized by citywide deployment.

The analysis is structured around five key dimensions: policy and regulation, service scale, integration with public transport, safety and social perception, and long-term feasibility. Each city is examined individually, followed by a comparative analysis to identify broader policy implications.

In Sydney (NSW), shared e-scooters are only permitted within state-approved trial areas. According to the NSW Shared E-scooter Trials: Program Report 2025, between 2022 and 2025 the NSW Government has successively launched pilot programs in six selected local government areas, including Wollongong. These explicitly temporary trials aim to assess safety, ridership, and compliance before considering wider adoption. Importantly, under the Road Rules 2014 (NSW), the use of private e-scooters on public roads remains prohibited, and they are only allowed on private property. This regulation reflects the NSW Government's cautious approach, driven by concerns over pedestrian safety, insurance liability, and inadequate infrastructure. Consequently, official government statements have positioned shared e-scooters as an experimental initiative rather than a permanent transport solution [22].

In contrast, Brisbane (QLD) has fully integrated shared e-scooters into its urban transport system. Since 2018, the Brisbane City Council has signed long-term contracts with operators such as Lime and Neuron, allowing e-scooters to operate across both central and suburban areas [21]. According to the Transport Operations (Road Use Management—Road Rules) (Personal Mobility Devices) Amendment Regulation 2018 (QLD) and the Rules for Personal Mobility Devices, e-scooters are classified as personal mobility devices (PMDs). These regulations permit private ownership of e-scooters and stipulate maximum speed limits for roads and footpaths, mandatory helmet use, and age restrictions. The government has emphasized that these regulatory measures—such as designated parking zones and speed limits in pedestrian-dense areas—aim to address emerging

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safety concerns rather than restrict e-scooter adoption. The Queensland Government consistently regards e-scooters as an integral component of its broader transport strategy [23].

This stark regulatory contrast makes Sydney and Brisbane ideal cases for comparative analysis. Sydney represents a restrictive, trial-based model with uncertain future prospects, whereas Brisbane reflects a liberal and institutionalized model that formally integrates e-scooters into the transport system.

This study draws on a combination of primary and secondary sources. Primary sources include government legislation, regulatory documents, and policy reports. In Sydney, key materials include Transport for NSW's NSW Shared E-Scooter Trials: Program Report (2025) and the NSW Legislation Road Rules 2014, which together provide the legal and institutional framework for the restricted trials. In Brisbane, the main sources include the Queensland Government's Personal Mobility Device Safety Action Plan and the Rules for Personal Mobility Devices, which collectively establish the policy framework governing e-scooter operations. Secondary sources consist of academic studies on micromobility, industry reports from operators, and media coverage.

4. Discussion

4.1. Governance and regulation

Policy and regulation represent one of the most fundamental points of divergence between Sydney and Brisbane in their approaches to managing shared e-scooters. In Sydney (NSW), the state government has adopted a highly cautious stance, treating shared e-scooters as experimental devices. According to the NSW Centre for Road Safety regulations on e-scooters, their operation is confined to government-designated trial areas with predetermined end dates (for example, Kogarah until 10 January 2025 and Wollongong until 30 June 2025). The use of privately owned e-scooters outside private property is subject to substantial fines [24]. This framework places e-scooters in a temporary and strictly controlled status, prioritizing risk management and liability control over rapid adoption. However, in recent years, as micromobility tools have gained popularity and demonstrated convenience, the NSW Government has publicly expressed its intention to legalize compliant e-scooters [25]—specifically those meeting requirements such as a speed limit of 10–20 km/h, a minimum rider age of 16 years, and prohibition of riding on footpaths [26]. Overall, the current framework remains transitional, oriented toward learning and experimentation under strict controls rather than full-scale integration into the transport system.

In contrast, Brisbane (QLD) follows a relatively liberal and institutionalized model. Queensland explicitly classifies e-scooters as personal mobility devices (PMDs) and regulates them through detailed legislative provisions. Under the Queensland Transport Operations Regulation 2009, users must wear an approved helmet, be at least 16 years old (or at least 12 under adult supervision), and comply with device requirements—such as specified dimensions, a maximum weight of 60 kg, and speed limits (typically 25 km/h on roads or cycleways and 12 km/h on footpaths). This clear regulatory framework enables citywide operation and routine enforcement. At the local level, the Brisbane City Council regulates operators through the Public Land and Council Assets Local Law (2014) (PLACA), which stipulates that certain activities require council approval and grants authority to remove improperly parked vehicles or equipment. For instance, Beam had its operating license revoked after multiple violations of parking and operational limits [27], reflecting the government's active and adaptive governance within a broadly permissive regulatory environment.

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4.2. Service scale, integration and safety

Table 1. Trial details and trip data by site

	Albury	Armidale	Forster-Tuncurry	Kogarah	Lake Macquarie	Wollongong
Trial Dates As at Dex 2024	15 Dec 23 – 14 Nov 24	7 Sep 23 - 6 Sep 24	8 Dec 23 - present	10 Jan 24 – 10 Jan 25	5 Dec 22 – 24 May 24	29 Sep 23 - present
Trial area	~18km2	11 km2	~5 km2	1 km2	35km of paths	7 km2
Total trips	61,080	47,326	75,930	11,100	17,631	198,561
Average weekly trips	1,247	892	1,356	218	232	3,604
Average trip length	1.96 km	1.68 km	2.43 km	0.86 km	1.56 km	1.95 km
Average trip duration	11.2 min	9.8 min	13.0 min	7.2 min	15.8 min	14.0 min

Regarding scale and geographic coverage, Sydney's deployment remains relatively small. The Albury trial area operates approximately 300 devices, while Kogarah has around 60 units. According to the official trip data (Table 1), other trial locations follow a similar scale of deployment. In contrast, Brisbane's coverage extends across nearly the entire metropolitan region, including suburban areas, with approximately 2,000 devices available. The significance of system scale can be understood in three key aspects:

• Visibility: People are more likely to use services they frequently encounter.

• Reliability: A higher device density increases the likelihood of finding an available scooter when needed.

• Data support: Larger e-scooter systems generate more comprehensive operational and safety datasets.

The emergence of shared e-scooters was primarily intended to enhance first- and last-mile connectivity. Sydney's small and fragmented trials mean that riders often cannot access e-scooters at both ends of their public transport journeys, weakening the potential for genuine first- and last-mile usage and limiting the ability to observe modal substitution effects (e.g., from car trips to public transport + e-scooter). Conversely, Brisbane's citywide coverage model ensures e-scooters are available within walking distance of transit stations and along high-frequency bus corridors, enabling habitual multimodal travel and allowing accurate measurement of mode shift patterns.

From the perspective of safety and social acceptance, Sydney's limited-scale trials have contributed to a lower incident rate. As of 2024, only 51 accidents were recorded, with 99.99% of trips occurring without incident [28]. However, the small sample size restricts the government's ability to calibrate preventive measures such as speed limits, footpath regulations, and parking standards due to insufficient local data. In contrast, Brisbane recorded approximately 4,000 accidents between 2021 and 2024, including 8 fatalities [29]. While a broader deployment inevitably results in a higher number of incidents, it also provides valuable data to refine regulations—covering

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aspects such as footpath speed limits, equipment requirements, night lighting, and bell usage—all of which have been incorporated into Queensland's PMD riding rules and fines.

Ultimately, the effectiveness of integration and safety strategies is closely tied to system scale. Sydney's limited deployment reduces direct risks but also constrains data collection and behavioral insights, making it more difficult to formulate robust policies. Brisbane's broader deployment requires continuous regulatory adjustments but simultaneously provides a solid empirical foundation for evidence-based governance.

4.3. Long-term feasibility, equality and policy lessons

Sydney's trial-based governance model has kept shared e-scooter programs in a temporary and uncertain state, which not only increases investment difficulty for operators but also makes it harder to achieve political permanence. In contrast, Brisbane's multi-year licensing system and citywide coverage have established a stable institutional setting, enabling operators to plan long term, develop large-scale warehouses, maintenance facilities, and staffing systems. Meanwhile, the city council can set clear regulatory parameters—including fleet caps, geofencing zones, and mandatory data-sharing requirements. This fundamental structural difference largely explains the divergent prospects for long-term integration.

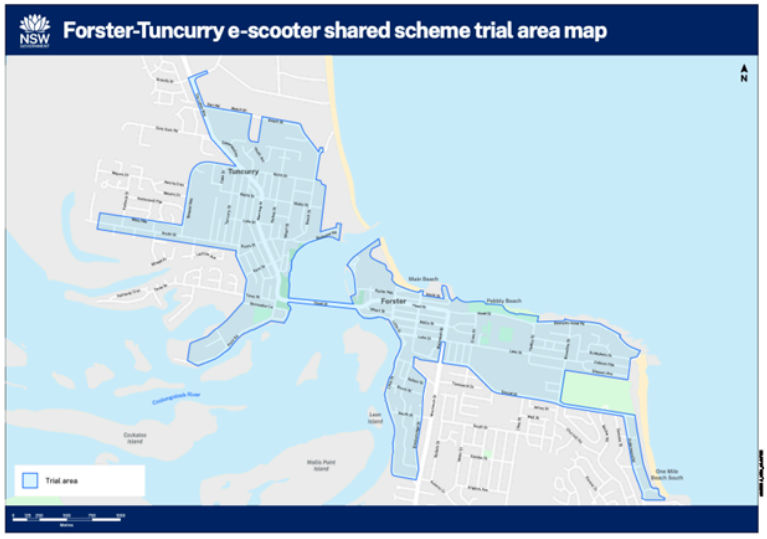

Figure 3. Forster-tuncurry e-scooter shared scheme trial area map [30]

Equity, often overlooked in micromobility discussions, represents another key dimension. Small-scale, concentrated trials tend to serve already well-connected areas. For instance, as shown in Figure 3, the Forster–Tuncurry trial primarily serves a tourist region, leaving peripheral suburbs and lower-income communities underrepresented. Sydney's sparse and discontinuous coverage further reduces the likelihood of passengers finding e-scooters near both ends of their public transport journeys, thereby weakening their true purpose. In contrast, Brisbane's citywide deployment extends service coverage to multiple rail and bus corridors and suburban zones, enhancing access to first- and last-mile connections. However, without explicit spatial equity obligations, commercial operators may still concentrate in high-demand, high-income areas, perpetuating service disparities in low-income or outer districts.

To translate these comparative findings into practical policy guidance, a set of city-specific yet complementary recommendations is proposed. For Sydney, transitioning beyond the prolonged "trial

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phase" may require extending license durations and expanding spatial coverage, supported by multi-year contracts with clear renewal criteria to encourage stable operator investment. Integration between micromobility and public transport should involve minimum service coverage standards, such as prioritizing deployment within 200–300 meters of rail or bus interchange stations, alongside equity-oriented coverage targets—for example, ensuring that residents within 400–600 meters of devices account for a defined share of the total population. At the same time, NSW should retain its strong safety standards but manage risks through geofencing, speed restrictions, and dedicated parking zones rather than blanket prohibitions. For Brisbane, achieving citywide integration requires incorporating spatial equity obligations directly into licensing agreements to ensure balanced and inclusive access across all communities.

5. Conclusion

This study compared two distinct governance models—the experimental planning model of Sydney and the institutionalized model of Brisbane—to examine whether shared e-scooters can effectively address the last-mile transport challenge in Australia. A comparative case analysis based on legislation, municipal ordinances, and government guidelines reveals that the initial regulatory framework determines the trajectory of future development. Sydney's pilot-based framework minimizes immediate risks but constrains system expansion. Its small-scale trials limit data accumulation, which in turn slows the integration of shared e-scooters into the public transport network. In contrast, Brisbane's multi-year licensing system and citywide deployment have normalized e-scooter use and generated extensive data to support iterative policy adjustments. The city's consistent coverage regulations and ongoing use of data-driven monitoring make the long-term integration of e-scooters into the transport system more feasible. The findings highlight three common mechanisms shaping micromobility outcomes. First, scale and geographic conditions influence reliability and the potential to connect e-scooter use with public transport. Second, the institutional design determines whether e-scooter implementation occurs under constraint (as in Sydney) or through system-level learning (as in Brisbane). Third, distribution rules determine who benefits—without clear spatial requirements, deployment often concentrates in well-served, high-demand areas.

Based on these insights, the study proposes complementary recommendations rather than a one-size-fits-all approach. For Sydney, project progression may require longer permit durations, broader spatial coverage, better integration with public transport, and the maintenance of strict state-level safety standards. For Brisbane, policy priorities should include establishing clear spatial responsibility, enhancing data-driven regulatory mechanisms (e.g., fleet size and parking compliance control), and developing equitable pricing systems to ensure that physical coverage translates into real spatial accessibility. When supported by sufficient urban scale, well-defined coverage areas, and clear accountability mechanisms—and when regulatory policies and deployment strategies are aligned—shared e-scooters can serve as an effective solution to last-mile connectivity challenges.

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