

The Micromobility Conundrum for Policymakers: Use of E-scooters in Singapore

“With a safe environment, the benefits of active mobility far outweigh the obstacles we are facing.”

- State for Transport Minister Mr. Lam Pin Min in the Parliament (7th March 2018)¹

“While regulations can be in place, ultimately, if (a person) wants to ride recklessly, nobody can stop you.... They need to know what consequences can come of (their reckless riding). They should control (their speeds) before it is too late.”

- A family member of Madam Ong Bee Eng, a 65-year-old cyclist, who died in hospital after succumbing to injuries from an e-scooter accident (26th September 2019)²

“There are many riders like me who aren't highly educated. We are just trying to make an honest living... The ban is going to be a huge blow to my rice bowl.”

- Mr Bai, 49, a food delivery rider with FoodPanda (November 2019)³

The above quotes are a microcosm of the e-scooter story in Singapore that started with fanfare and ended with an abrupt ban. Micromobility refers to the use of small devices typically weighing less than 350 kilograms and with a maximum speed of 45 km/h.⁴ It is touted to be the future of urban transportation⁵, of which e-scooters have been a key type. The International Transport Forum defines e-scooter as a stand-up scooter or seated one that can run on an electric motor, whether the user kicks it or not.

The proliferation of e-scooters had given a boost to the transportation landscape in Singapore. Singapore has promoted active mobility through various initiatives in the Land Transport Master plan 2040 to make the country car-lite and introduced the ‘Walk-Cycle-

¹ Osman Dhany, ‘Mandatory Registration of E-Scooters by End-2018: Lam Pin Min’, 7 March 2018, <https://sg.news.yahoo.com/mandatory-registration-e-scooters-end-2018-lam-pin-min-050659367.html>. Osman,

² Pei Ting Wong, ‘Devastated Family of Woman Killed in PMD Collision Urges Speedsters to “know the Consequences”’, *TODAYonline*, 26 September 2019, <https://www.todayonline.com/singapore/devastated-family-woman-killed-pmd-collision-urges-speeding-riders-know-consequences>.

³ Tatiana Mohamad Rosli, ‘Delivery Riders Worry about E-Scooter Ban’, *The New Paper*, 6 November 2019, <https://www.tnp.sg/news/singapore/delivery-riders-worry-about-pmd-ban>.

⁴ Alexandre Santacreu, ‘Safe Micromobility’ (International Transport Forum, 2020), https://www.itf-oecd.org/sites/default/files/docs/safe-micromobility_1.pdf.

⁵ Rasheq Zarif, Derek Pankratz, and Ben Kelman, ‘Making Micromobility Work for Citizens, Cities, and Service Providers’, n.d., 18.

This case was written by Devyani Pande under the guidance of Prof Araz Taeihagh, Lee Kuan Yew School of Public Policy (LKYSPP), National University of Singapore and has been funded by the LKYSPP. The case does not reflect the views of the sponsoring organisation nor is it intended to suggest correct or incorrect handling of the situation depicted. The case is not intended to serve as a primary source of data and is meant solely for class discussion.

Ride' for better public transport.⁶ Using e-scooters has various benefits for the users, including solving the first and last mile problem, cost-effectiveness, and reducing environmental pollution. However, there are also risks in their operation that developed in the years after being adopted in Singapore. This case study traces the adoption of e-scooters in Singapore and the regulations undertaken by the government to analyse the policy implications of the different types of governing strategies.

E-scooter adoption and initial regulations (up to 2017)

The Land Transport Authority (LTA) is a statutory board under the Ministry of Transport that plans, designs, builds, and maintains the transport systems and infrastructure in Singapore.⁷ The LTA classifies e-scooters under personal mobility devices (PMDs) that are motorised, within the larger category of active mobility devices.⁸ The first set of regulations pertaining to Singapore's active mobility devices were proposed by the Active Mobility Advisory Panel (AMAP). The AMAP comprises representatives from a diverse set of stakeholders from all age groups, who are users of micromobility devices and would be affected by their operation. It was established by LTA in 2014.

The report by the AMAP proposed that active mobility devices be operated only on footpaths and cycling paths with speed limits of 15 km/hr and 25 km/hr respectively; specified maximum width and weight of 70 cm and 20 kg respectively; and listed a code of conduct for riders.⁹ The code of conduct proposed required riders to ring the bell or give a signal while overtaking; install a light on the e-scooter to be used while riding in the night; wear a luminous vest or install a light on the helmet; keep and maintain the device in good condition; and provide aid in the case of an accident.¹⁰

The LTA accepted all the AMAP's recommendations which were put forth in the Active Mobility Bill. The Active Mobility Bill also called for the formation of an active mobility patrolling group comprising enforcement officers, path wardens and volunteers. The penalties for offences involving non-compliance with device requirements, exceeding speed limits, driving on roads, and not following the code of conduct were decided as \$100, \$200, and \$500 for first, second, third and subsequent offences. To encourage the use of active mobility devices, various trials were undertaken, and requisite infrastructure were being built to accommodate the use of the devices. Ang Mo Kio (AMK) was being developed as the

⁶ "Land Transport Master Plan 2040: Bringing Singapore Together," May 25, 2019. <https://www.lta.gov.sg/content/ltagov/en/newsroom/2019/5/2/land-transport-master-plan-2040-bringing-singapore-together.html>.

⁷ LTA, 'LTA | Who We Are', 2021, https://www.lta.gov.sg/content/ltagov/en/who_we_are.html.

⁸ According to LTA, active mobility devices are as follows: bicycles, motorised and non-motorised PMDs (e-scooters, power-assisted bikes, hoverboards, unicycles etc.), and personal mobility aids or PMAs (wheelchairs or scooters for the disabled).

⁹ AMAP, 'Recommendations on Rules and Code of Conduct for Cycling and the Use of Personal Mobility Devices', 17 March 2016, [https://www.lta.gov.sg/content/dam/ltagov/news/press/2016/20160317_AMAPPanelReport\(final\).pdf](https://www.lta.gov.sg/content/dam/ltagov/news/press/2016/20160317_AMAPPanelReport(final).pdf).

¹⁰ Ibid.

first walking and cycling town in Singapore.¹¹ This was done by building paths to connect the MRT station, AMK Hub and swimming pool.

With the growing popularity of e-scooters since 2016, the risks of active mobility devices also started to manifest. In September 2016, a lady suffered life-threatening brain injuries and cognitive impairment after being hit by an e-scooter driven by a teenager.¹² He was later charged in court. This brought to light the dire consequences of accidents involving e-scooters. The number of accidents involving PMDs (including e-scooters) was 90 in the first half of 2017 with 4 fatalities.¹³ To promote awareness about safe riding, a Safe Riding Campaign for PMDs and Safe Cycling Programme for bicycles were introduced to educate users about the various regulations introduced. The government had also started educating users about devices' compliance requirements, and the enforcement officers had started confiscating non-compliant devices along with catching errant riders¹⁴. It was decided that locations with a high risk of accidents involving active mobility devices would have CCTV cameras set up and strict enforcement of the regulations by enforcement officers.

The safety of users and pedestrians was cited as the foremost motive of the members of the parliament, who called for stricter regulations of registration of all devices, mandatory third-party insurance and use of helmets while riding.¹⁵ After due deliberations in the parliament, the parliament passed the Active Mobility Bill on 10 January 2017. It became the Active Mobility Act (2017) on 20 June 2017¹⁶ with a later enforcement date in 2018.

Beginning of e-scooter sharing services, safety concerns, and the imposition of regulations (2017-2018)

The introduction of e-scooter sharing services in Singapore began when Telepod and a local start-up Neuron Mobility provided e-scooters for hire in Suntec city and Science Park 1 during June 2017 trials.¹⁷ Later, companies such as PopScoot and Floatility also introduced services with a limited fleet in different locations like downtown and the heartlands. The pricing for hire was kept nominal by the service providers—50 cents for 15 minutes by

¹¹ Adrian Lim, 'First Phase to Transform Ang Mo Kio into Cycling and Walking Town Completed', *The Straits Times*, 9 July 2016, <https://www.straitstimes.com/singapore/transport/first-phase-to-transform-ang-mo-kio-into-cycling-and-walking-town-completed>.

¹² Adrian Lim, 'Housewife Still Unconscious after Accident Involving Electric Scooter; Teenager Arrested', *The Straits Times*, 21 September 2016, <https://www.straitstimes.com/singapore/courts-crime/housewife-still-unconscious-after-accident-involving-electric-scooter>.

¹³ Lim Adrian, 'Parliament: 90 Accidents, with 4 Deaths, Involving e-Bikes and Personal Mobility Devices in First Half of 2017', *The Straits Times*, 2 October 2017, <https://www.straitstimes.com/politics/parliament-90-accidents-involving-electric-bikes-and-personal-mobility-devices-in-first>.

¹⁴ Xing Hui Kok, 'LTA Cracks down on Errant PMD Users', *The Straits Times*, 25 February 2017, <https://www.straitstimes.com/singapore/transport/lta-cracks-down-on-errant-pmd-users>.

¹⁵ Ming En Siau, 'Jail, Fines to Combat Reckless Use of Personal Mobility Devices', *TODAYonline*, 11 January 2017, <https://www.todayonline.com/singapore/jail-fines-combat-reckless-use-personal-mobility-devices>.

¹⁶ Singapore Statutes Online, 'Active Mobility Bill - Singapore Statutes Online', 2016, <https://sso.agc.gov.sg/Bills-Supp/40-2016/Published/20161109?DocDate=20161109>.

¹⁷ Zafirah Salim, 'Scoot Over, Bike-Sharing - 3rd E-Scooter Sharing Startup Rolling Into Town This September', *Vulcan Post* (blog), 28 August 2017, <https://vulcanpost.com/616577/popscoot-e-scooter-sharing/>.

Neuron, \$1 for 10 minutes by Telepod, and \$2 for 30 minutes.¹⁸ This was rolled out as part of trials, with the service providers operating in private agreements with townships and landlords.

Towards the latter half of 2017, more risks like fire accidents due to overcharging e-scooter batteries and hit-and-run cases began to transpire. The number of fire accidents involving PMDs increased significantly from 19 between January and September 2017 to 31 over the same period in 2018, according to the Singapore Civil Defence Force (SCDF).¹⁹ In quite a few instances, fire accidents resulted from overcharging cheap batteries in e-scooters that led to explosions and subsequent flames. The increasing sales of cheap unbranded batteries on e-commerce platforms such as Carousell and Taobao, water damage to the devices, or illegal modifications were also major factors contributing to these accidents.²⁰

To control the fire-related risks, the SCDF repeatedly posted advisories on their Facebook page on the use and maintenance of PMDs (Exhibit 1). The PMD batteries were not to be left overnight for charging, and not to be placed near combustible materials or escape routes. Users were to place the PMDs on hard surfaces for appropriate diffusion of heat, and pay heed to any damages due to corrosion or bloating. To identify the use of safe devices, SPRING Singapore, the standards setting body in Singapore (till 2018)²¹ and the LTA started reviewing the testing and certification requirement for PMDs. SPRING Singapore also inspected retailers. It found some retailers selling illegally modified active mobility devices and six e-scooter suppliers selling unregistered charging adaptors for PMDs.²²

Overtime, the frequency of accidents involving PMDs increased. In a study conducted on injuries due to e-scooter accidents, the emergency department in Singapore General Hospital reported an increase of 2.3 times between 2015 and 2016.²³ On average, there were 3 accidents in a week involving PMDs during 2017.²⁴ Other issues related to the operation of e-scooters that came to light were first, the lack of appropriate infrastructure indicated by narrow or broken stretches of paths, and paths that were not well-lit; and

¹⁸ Ibid.

¹⁹ Amanda Lee, 'At Least 34 PMD-Related Fires This Year', *TODAYonline*, 8 November 2017, <https://www.todayonline.com/singapore/least-34-cases-fire-involving-pmds-year>.

²⁰ Zhaki Abdullah and Sue-Ann Cheow, 'Experts: Cheap Batteries Could Be behind Increase in e-Scooter, e-Bike Fires', *The Straits Times*, 9 November 2017, <https://www.straitstimes.com/singapore/experts-cheap-batteries-could-be-behind-increase-in-e-scooter-e-bike-fires>.

²¹ In April 2018, International Enterprise Singapore and SPRING merged to form Enterprise Singapore, to promote enterprise development, and also acting as the standards setting body.

²² Jose Hong and Ng Huiwen, 'Spring Singapore Uncovers 6 E-Scooter Suppliers Selling Unregistered Charging Adaptors; Seizes 175 Adaptors', *The Straits Times*, 29 December 2017, <https://www.straitstimes.com/singapore/spring-singapore-uncovers-6-e-scooter-suppliers-selling-unregistered-charging-adaptors>.

²³ Yee Kent Liew, Choon Peng Jeremy Wee, and Jen Heng Pek, 'New Peril on Our Roads: A Retrospective Study of Electric Scooter-Related Injuries', *Singapore Medical Journal* 61, no. 2 (2020): 92.

²⁴ Adrian Lim, 'Parliament: About Three Accidents a Week Involving Personal Mobility Device Users', *The Straits Times*, 8 January 2018, <https://www.straitstimes.com/politics/parliament-average-of-three-accidents-a-month-involving-pedestrians-and-personal-mobility>.

second, the lack of separate rules for the various types of micromobility devices—PMDs, PMAs, and e-bikes.

To control the accidents and ensure safety, the government introduced more penalties and reforms from January 2018 onwards. The LTA increased the penalties to \$300 for a first-time offence on a local road and \$500 on a major public road with a charge to be present in court if found riding on expressways, and a maximum penalty of \$2000 and jail for 3 months along with confiscation of device.^{25,26} To educate riders and create more awareness about safe riding, a Safe Riding Programme involving theory and practical lessons in schools, community clubs, and dormitories housing foreign workers was undertaken in addition to placing banners in 175 locations as an advisory for not riding on roads.²⁷ A key segment of users of PMDs was also food delivery riders of the three main companies in Singapore—Deliveroo, GrabFood, and Foodpanda. In February 2018, in anticipation of the rise in food deliveries during Chinese New Year, a guide on safe riding and storage spaces for carrying packages in PMDs was issued to the riders by the Workplace Safety and Health (WSH) Council.²⁸

Enforcement of regulations and tighter control (2018-2019)

The Active Mobility Act was enforced on 1st May 2018, which led to the imposition of all legislations put forward in the Act. The key regulations related to e-scooters in the Act were as follows:

Subject	Regulations that applied to e-scooters
Size and Weight	Maximum weight of 20 kg, with a maximum width of 700 mm.
Speed limits	15 km/hr on footpaths and 25 km/hr only on park connectors and shared paths. - The in-built speed of e-scooters cannot be over 25 km/hr, and no modifications can be made.
Penalties	- Speeding or riding on paths that are not for e-scooters would attract a fine of \$1000 or jail for 3 months or both - Illegal modifications to devices would be fined \$5000 or jail for 6 months, or both, for the first offence. Subsequent

²⁵ Christopher Tan, 'Stiffer Fines, Possible Jail Time for Offences Involving Personal Mobility Devices from Jan 15', *The Straits Times*, 2 January 2018, <https://www.straitstimes.com/singapore/transport/fines-for-personal-mobility-device-offences-to-treble-from-jan-15>.

²⁶ Adrian Lim, 'Stiffer Penalties for Errant PMD Users Timely, but Experts Also Call for More Education', *The Straits Times*, 2 January 2018, <https://www.straitstimes.com/singapore/transport/stiffer-penalties-for-errant-pmd-users-timely-but-experts-also-call-for-more>.

²⁷ Zhaki Abdullah, '38 Caught Riding PMDs on Roads since Start of Year', *The Straits Times*, 16 January 2018, <https://www.straitstimes.com/singapore/transport/38-caught-riding-pmds-on-roads-since-start-of-year>.

²⁸ Zhaki Abdullah, 'New Safe Riding Guide for Food Delivery Riders', *The Straits Times*, 9 February 2018, <https://www.straitstimes.com/singapore/new-safe-riding-guide-for-food-delivery-riders>.

	offences would be fined \$10,000 or jail upto six months or both.
Regulations for Retailers	• Retailers were disallowed to sell devices not compliant with size, weight, and other requirements. • The devices sold were to possess warning notices along with rules of usage. • Penalties for retailers for not following the rules were a fine of up to \$5000 and/or jail up to 3 months for being caught for the first time.

Source: Active Mobility Act (2017)

With this, the enforcement of rules became more stringent, and e-scooters began to be confiscated by enforcement officers (Exhibit 2). Speed guns were also provided to the enforcement officers to catch reckless riders.²⁹ Over 300 PMD users were caught for offences between May and June 2018.³⁰ In an LTA inspection of retailers selling PMDs, five retailers were found to be advertising or displaying non-compliant devices, and five retailers had not displayed the warning notice required to be affixed on them.³¹

Even though stringent regulations had been imposed through the Active Mobility Act, according to a study in Khoo Teck Puat Hospital, the number of accidents involving PMDs and severity of injuries increased substantially between November 2014 and October 2017.³² In another round of review in August 2018, the AMAP proposed recommendations that were accepted by the LTA: lowering the speed limit to 10 km/hr on footpaths, making helmets mandatory for users, voluntary provision of third-party insurance, and the need for riders to inculcate a habit of stopping to look for traffic.³³

Due to the increase of accidents, the Land Transport (Enforcement Measures) Bill was passed in 2019 to enforce tougher regulations for safety.³⁴ There were some key measures, especially for the users of e-scooters. First, the registration of e-scooters was made

²⁹ Adrian Lim, 'Speed Guns Deployed to Curb Reckless Riding', *The Straits Times*, 3 May 2018, <https://www.straitstimes.com/singapore/transport/speed-guns-deployed-to-curb-reckless-riding>.

³⁰ Adrian Lim, '9 in 10 PMDs and E-Bikes Confiscated Due to Their Size, Weight or Top Speed: LTA', *The Straits Times*, 16 June 2018, <https://www.straitstimes.com/singapore/transport/9-in-10-personal-mobility-devices-and-e-bikes-confiscated-due-to-their-size>.

³¹ LTA, 'LTA | News Room | News Releases | Island-Wide Sting Operation Against Errant PMD and PAB Retailers', 14 August 2018, <https://www.lta.gov.sg/content/ltgov/en/newsroom/2018/8/2/island-wide-sting-operation-against-errant-pmd-and-pab-retailers.html>.

³² Wey Ting Lee et al., 'Hospital Seeing More Personal Mobility Device Accidents and Serious Injuries despite Active Mobility Act', *Journal of Emergencies, Trauma, and Shock* 13, no. 4 (2020): 274.

³³ AMAP, 'Review of Active Mobility Regulations for Safer Path Sharing', 24 August 2018, <https://www.mot.gov.sg/docs/default-source/default-document-library/amap-report---review-of-active-mobility-regulations-for-safer-path-sharing.pdf>.

³⁴ Ministry of Transport, 'Speech by Senior Minister of State for Transport Dr Lam Pin Min on Second Reading of the Land Transport Enforcement Measures Bill 2018', 10 September 2018, [http://www.mot.gov.sg/news-centre/news/Detail/speech-by-senior-minister-of-state-for-transport-dr-lam-pin-min-on-second-reading-of-the-land-transport-\(enforcement-measures\)-bill-2018/](http://www.mot.gov.sg/news-centre/news/Detail/speech-by-senior-minister-of-state-for-transport-dr-lam-pin-min-on-second-reading-of-the-land-transport-(enforcement-measures)-bill-2018/).

mandatory. This involved registering the user's particulars and specifications of the e-scooter (size and weight), after which a registration number and mark would be allotted that were required to be affixed on the device (Exhibit 3). To address the concerns about fire accidents, the UL2272 standard set by an independent certification company that was most appropriate for e-scooters and other PMDs in Singapore was adopted. Only devices compliant with this standard were to be allowed from January 2021 (this deadline was later changed to July 2020). The Act also laid down that the owner would be responsible unless he/she could prove otherwise in case of an accident. In addition, outsourced enforcement officers were employed to help in enforcing the regulations imposed by the LTA.

Introduction of licensing regime for e-scooter sharing companies and calls for a ban on e-scooters (2018-2019)

Due to the popularity of e-scooters, some e-scooter sharing companies had started operations, but they were limited to trials implemented via private agreements in specified areas.³⁵ In October 2018, the LTA issued a statement specifying the licensing requirements for operation of device-sharing, and penalties of up to \$10,000 and jail in addition to \$500 for every additional day of operation for unlicensed e-scooter sharing providers.³⁶ The LTA clarified that the application cycle for 'sandbox licenses' would open in January 2019 for the service providers of e-scooters and other PMDs. Fourteen e-scooter sharing providers applied for sandbox licenses to operate a minimum of 200 and maximum of 500 devices in the first application cycle ending February 2019.³⁷ During the waiting period, the LTA confiscated e-scooters of device-sharing companies—Neuron Mobility, Telepod, and Beam as they were deemed to be operating illegally without licenses.³⁸ The court charged Neuron Mobility and Telepod for providing devices without license or exemptions and fined them \$38,000 and \$16,000 respectively.³⁹

In the meantime, as safety became a growing concern, apart from introducing CCTVs, the LTA introduced a feature on its MyTransport.SG app in June 2019 whereby photos or videos of reckless driving could be submitted by the app users.⁴⁰ With 31 June 2019 as the deadline

³⁵ Zhaki Abdullah, 'New E-Scooter Start-up Beam Can Only Apply for Licence in Jan 2019, LTA Clarifies', *The Straits Times*, 24 October 2018, <https://www.straitstimes.com/singapore/transport/new-e-scooter-startup-beam-can-only-apply-for-licence-in-jan-2019-lta-clarifies>.

³⁶ Ibid.

³⁷ Zhaki Abdullah, '14 Companies Vying for PMD-Sharing Licence', *The Straits Times*, 12 February 2019, <https://www.straitstimes.com/singapore/transport/14-companies-vying-for-pmd-sharing-licence>.

³⁸ Coconuts Singapore, 'LTA Impounds 42 Shared E-Scooters from Neuron Mobility, Telepod and Beam Found in the City | Coconuts Singapore', Coconuts, 14 November 2018, <https://coconuts.co/singapore/news/lta-impounds-42-shared-electric-scooters-neuron-mobility-telepod-beam-found-city/>.

³⁹ S Alkhatib, 'Two Firms Fined \$54k in Total over Unlicensed Dockless E-Scooter Sharing Services', *The Straits Times*, 16 September 2019, <https://www.straitstimes.com/singapore/courts-crime/two-firms-fined-54k-in-total-over-unlicensed-dockless-e-scooter-sharing>. Alkhatib, Shaffiq.

⁴⁰ Toh Ting Wei, 'Complaints against Errant PMD Users May Soon Be Made through MyTransport.SG App', *The Straits Times*, 20 June 2019, <https://www.straitstimes.com/singapore/transport/complaints-of-errant-pmd-users-may-soon-be-made-through-mytransportsg-app>.

for registration of e-scooters, the LTA received over 85,000 registrations with majority of the registrants between the ages of 21 to 50.⁴¹

By 2019, the operation of e-scooters had become a much-debated topic in Parliament. In August 2019, additional rules related to inspecting regime for compliance, improving infrastructure and trial of pedestrian-free zones were imposed.⁴² A mandatory inspection of PMDs for UL2272 certification and compliance requirements listed by the LTA was to be executed. The deadline for using only UL2272 compliant devices was changed to July 2020 from January 2021. This was done due to the rising fire accidents that were reported to be 49 in the first half of 2019, as compared to 52 in 2018.⁴³ At the same time, \$50 million was to be spent on widening paths and putting warning signs. On a trial basis, some zones were demarcated where PMD users were to dismount and push the devices, and markings reminding PMD users to slow down were made on footpaths. The employment of more members in the LTA enforcement team was also announced.

Since fire accidents were also jeopardising e-scooter users' safety, a government task force involving the SCDF, LTA, Housing and Development Board, and Enterprise Singapore was established in August 2019 to control and manage fire-related accidents.⁴⁴ In September 2019, a scheme for early disposal of e-scooters that were not compliant with UL2272 was introduced with an incentive of \$100 for registrants.⁴⁵ Meanwhile, the offences recorded related to active mobility devices increased from 595 to 761 from July to August 2019 with 214 devices confiscated.⁴⁶ To add to this, the death of a 65-year-old lady after colliding with a non-compliant e-scooter set into motion the sentiment to ban e-scooters⁴⁷.

Banning e-scooters and addressing the unintended consequences through the transition assistance package (2019-2020)

⁴¹ Toh Ting Wei, 'More than 85,000 e-Scooters Registered with LTA as New Rules Kick In', *The Straits Times*, 1 July 2019, 85, <https://www.straitstimes.com/singapore/transport/more-than-85000-e-scooters-registered-with-lta-as-new-rules-kick-in>.

⁴² Ministry of Transport, 'Ministerial Statement by Senior Minister of State for Transport Dr Lam Pin Min on Personal Mobility Devices', 5 August 2019, <http://www.mot.gov.sg/news-centre/news/detail/ministerial-statement-by-senior-minister-of-state-for-transport-dr-lam-pin-min-on-personal-mobility-devices>.

⁴³ Aqil Haziq Mahmud, 'PMD Safety Certification Deadline Moved Forward to July 2020; All e-Scooters to Go through Mandatory Inspection', *CNA*, 5 August 2019, <https://www.channelnewsasia.com/news/singapore/pmd-fire-safety-compliance-deadline-mandatory-inspection-11781816>.

⁴⁴ Tan Tam Mei, 'Govt Task Force Set up to Help Snuff out PMD Fire Risks', *The Straits Times*, 2 September 2019, <https://www.straitstimes.com/singapore/govt-task-force-set-up-to-help-snuff-out-pmd-fire-risks>.

⁴⁵ LTA, 'LTA | News Room | News Releases | Measures to Encourage Early Disposal of Non-UL2272 PMDs', 20 September 2019, https://www.lta.gov.sg/content/ltagov/en/newsroom/2019/9/2/20190920_nonUL2272_PMDs_disposal.html.

⁴⁶ Zhaki Abdullah, '761 PMD-Related Offences Last Month, up from 595 in July', *The Straits Times*, 7 September 2019, <https://www.straitstimes.com/singapore/transport/761-pmd-related-offences-last-month-up-from-595-in-july>.

⁴⁷ Wong, 'Devastated Family of Woman Killed in PMD Collision Urges Speedsters to "know the Consequences" - TODAY'.

On 27 September 2019, the AMAP again submitted their recommendations to make third-party insurance mandatory for businesses, set a minimum age of 16 years to ride e-scooters, ban the use of mobile phones while riding PMDs, and implement a mandatory theory test for e-scooter riders before riding them.⁴⁸ The government later accepted these recommendations in December 2019.

In October 2019, a statement by the senior minister of state for transportation on the need to improve safe riding behaviour for PMDs or prepare for a ban, and calls from citizen groups to disallow e-scooters from footpaths raised the possibility of an outright ban. During the same month, three condominiums in Singapore had banned the entry of e-scooters used by food delivery riders. The LTA had also been delaying the announcement on the results of the licensing regime for e-scooter service providers. Finally, after a comprehensive review by the LTA, e-scooters were banned from all footpaths, except on cycling paths and park connector networks, on 5 November 2019. The LTA also rejected the license applications of e-scooter sharing companies and prohibited any further applications.

One of the key ramifications of the ban was on the livelihoods of the food delivery riders who used e-scooters extensively. The outcry against the ban from the food delivery riders of GrabFood, Foodpanda and Deliveroo were due to the fact that PMDs were a key mode of transport for them, and they presented their concerns in meetings with ministers in 'meet-the-people' sessions.⁴⁹ To help the estimated 7,000 food delivery riders, a 'transition assistance package' was introduced comprising a trade-in grant with \$7 million funded equally by the three food delivery companies (Grab Food, Foodpanda and Deliveroo) and the government.⁵⁰ The trade-in grant provided food delivery riders trading in their existing e-scooters with \$1000 to buy an e-bike, or \$600 for a bicycle. In addition, the riders were also given a chance to look for alternative jobs with the help of the Employment and Employability Institute and Workforce Singapore.

In February 2020, through amendments to the Active Mobility Act, more stringent regulations were introduced. There was a ban on e-scooters along with other PMDs on the footpaths, a competency test certificate was required for riders, an age limit of 16 years was imposed for riding, and third-party insurance for employees was made mandatory for businesses. The penalties for PMDs on public paths was \$2,000 and jail for 6 months or both, and on roads was \$10,000 and jail for 3 years or both.

⁴⁸ AMAP, 'Review of Active Mobility Regulations for Safer Path Sharing. Recommendations by the Active Mobility Advisory Panel', 27 September 2019, https://www.mot.gov.sg/docs/default-source/default-document-library/2019-amap-report_final.pdf.

⁴⁹ Toh Ting Wei, 'E-Scooters Banned on Footpaths: Food Delivery Riders Meet Shanmugam to Voice Concerns over New Rule', *The Straits Times*, 6 November 2019, <https://www.straitstimes.com/singapore/transport/food-delivery-riders-meet-shanmugam-to-express-concerns-about-e-scooter-footpath>.

⁵⁰ Ministry of Transport, '7 Million E-Scooter Trade-in Grant to Help Food Delivery Riders Switch to Alternative Modes of Transport', 8 November 2019, <http://www.mot.gov.sg/news-centre/news/detail/7-million-dollars-e-scooter-trade-in-grant-to-help-food-delivery-riders-switch-to-alternative-modes-of-transport>.

Governance of new technologies

Due to the dynamic nature of novel technologies, their governance poses many problems and depends on various factors. The description of the evolution in the governance of e-scooters highlights these factors. The pacing problem defined as the situation of innovation outpacing the existing regulations to manage the consequences of the innovations⁵¹ has been one of the key concerns of governments all over. In the case of e-scooter adoption in Singapore, the government followed various governing strategies to combat the risks over time.

The framework for analysing strategies undertaken by the government to cope with risks is appropriate to study the evolution of regulating e-scooters in Singapore. This conceptual framework is based on the various risk-coping strategies adopted to manage risks and outlines those categories in a continuum.⁵² It provides a spectrum of governance strategies adopted by governments to manage risks from a policy perspective. These strategies are as follows⁵³: no-response strategy (when the government takes no actions to deal with the risks), prevention-oriented strategy (when decisionmakers pre-empt risks by taking actions for governance), precaution-oriented strategy (when the government undertakes precautionary actions through cost-benefit analysis or other evidence), control oriented strategy (the regulatory approach of using policy instruments), toleration-oriented strategy (the strategy of designing rules for unanticipated risks and increasing readiness of the government), and adaptation-oriented strategy (this strategy involves increasing the capacity of the government to deal with policy uncertainty).



Figure 1: Framework for analysing risk coping strategies

Based on the typology of risk coping strategies, in the initial stage, a no-response strategy was adopted to see how the adoption of the technology would pan out before the AMAP proposed initial regulations. The government used the conventional approach of a control-oriented strategy by using policy instruments to regulate the risks arising from the use of e-scooters. This was evident by the imposition of speed limits, conditions under which compliant devices were allowed to be used, and various penalties for offences. Over time the toleration-oriented and adaptation-oriented strategies were used to anticipate risks and prepare for the new technology, build robust infrastructure, and increase the government's

⁵¹ Adam Thierer, 'The Pacing Problem and the Future of Technology Regulation', Mercatus Center, 8 August 2018, <https://www.mercatus.org/bridge/commentary/pacing-problem-and-future-technology-regulation>.

⁵² Yanwei Li et al., 'Toward a Commonly Shared Public Policy Perspective for Analyzing Risk Coping Strategies', *Risk Analysis*, 2020.

⁵³ Ibid.

capacity in dealing with policy uncertainty.⁵⁴ Infrastructure for e-scooters and active mobility devices and safe riding programs were developed. As a result of the increased number of accidents, the government combined prevention and adaptation-oriented strategies by introducing a ban on e-scooters and other devices on public paths and footpaths while consulting stakeholders in developing a transition assistance package to address the unintended consequences.

Epilogue

Post-February 2020 until May 2020, there were no additional regulations introduced regarding e-scooters apart from the already existing rules. There was an amendment introduced to the Active Mobility Act and the Small Motorised Vehicles (Safety) bill in May 2020.⁵⁵ The key change introduced was that permission from the LTA had to be sought to import PMDs. This was aimed at restricting illegally modified devices and allow for quick forfeiture of non-compliant devices.

The decision to ban e-scooters and other PMDs from footpaths and public paths in Singapore was no different from the decisions taken in other countries of the world like France, UK, and a few cities in the United States as the safety risks became an increasing concern.⁵⁶ Safety risks were a key issue in Singapore given the increasing cases of reckless riding, accidents on the road and fire accidents. Problems like indiscriminate parking and privacy issues due to data collection by e-scooter sharing companies were some of the other risks that the adoption of e-scooters would bring about. Privacy and cybersecurity risks have also been cited when e-scooter sharing companies track their users.⁵⁷ In addition to the safety risks, the government would have to foresee and manage these, when and if e-scooter companies became active in Singapore.

⁵⁴ Araz Taeihagh and Hazel Si Min Lim, 'Governing Autonomous Vehicles: Emerging Responses for Safety, Liability, Privacy, Cybersecurity, and Industry Risks', *Transport Reviews* 39, no. 1 (2 January 2019): 103–28, <https://doi.org/10.1080/01441647.2018.1494640>.

⁵⁵ Ministry of Transport, 'Opening Speech by Senior Minister of State for Transport Dr Lam Pin Min on Second Reading of Small Motorised Vehicles Safety Bill and Active Mobility Amendment No. 2 Bill', 26 May 2020, [http://www.mot.gov.sg/news-centre/news/Detail/opening-speech-by-senior-minister-of-state-for-transport-dr-lam-pin-min-on-second-reading-of-small-motorised-vehicles-\(safety\)-bill-and-active-mobility-\(amendment-no.-2\)-bill/](http://www.mot.gov.sg/news-centre/news/Detail/opening-speech-by-senior-minister-of-state-for-transport-dr-lam-pin-min-on-second-reading-of-small-motorised-vehicles-(safety)-bill-and-active-mobility-(amendment-no.-2)-bill/).

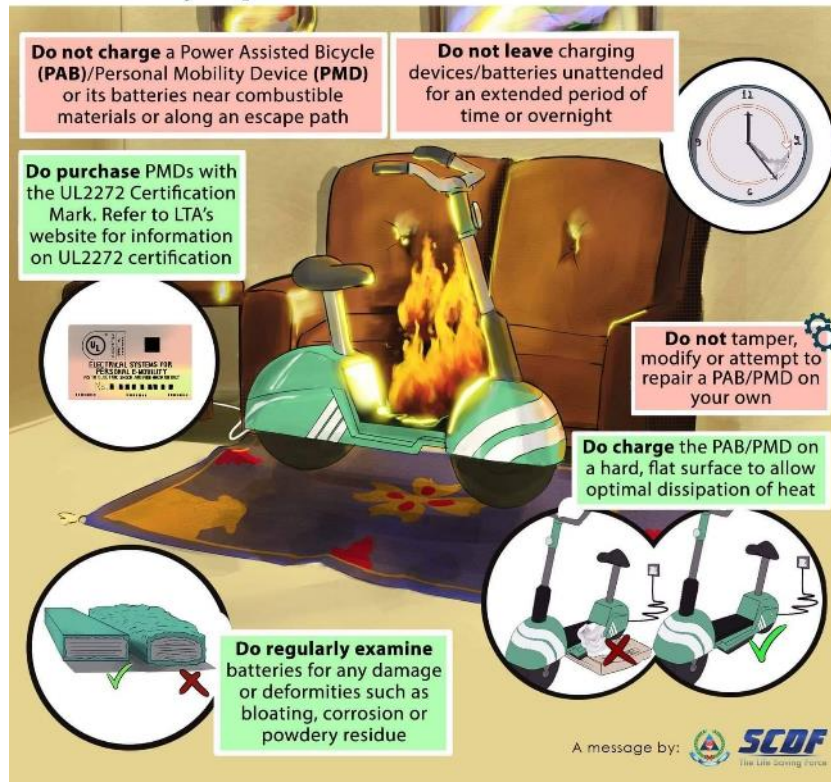
⁵⁶ 'From Paris to Singapore, Cities Put the Brakes on e-Scooters', *TODAYonline*, 6 November 2019, <https://www.todayonline.com/world/paris-singapore-cities-put-brakes-e-scooters>.

⁵⁷ Nisha Vinayaga-Sureshkanth et al., 'Security and Privacy Challenges in Upcoming Intelligent Urban Micromobility Transportation Systems', in *Proceedings of the Second ACM Workshop on Automotive and Aerial Vehicle Security*, 2020, 31–35.

Exhibits

Exhibit 1: A poster on fire safety tips by SCDF

Fire Safety Tips for PMDs and PABs



Source: SCDF Facebook page, July 26, 2019.

Exhibit 2: (a) A 64 kg e-scooter confiscated in May 2018 and (b) a 26.8 kg e-scooter confiscated by enforcement officers in August 2019



(a)



(b)

Source: LTA Facebook page

Exhibit 3: Registration marks of the UL2272 standard, registration mark, and identification mark required by LTA



Source: Hur, Chew Boon, '5 things you may have missed on LTA E-scooter registration.' *Mobot blog*, <https://mobot.sg/blog/5-things-you-may-have-missed-on-lta-electric-scooter-e-scooter-registration/>