# Vertically integrated public transport measures

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[1] This research was conducted July 2024-June 2025

# Acknowledgements

# Abbreviations and acronyms

| COMET | Community of Metros |
|---|---|
| FTE | full-time equivalent |
| GIS | geographic information system |
| GPS | global positioning system |
| MTR | Mass Transit Railway Corporation |
| NSW | New South Wales |
| NZTA | NZ Transport Agency Waka Kotahi |
| PTA | public transport authority |
| RCA | road controlling authority |
| RPTP | regional public transport plan |
| RUB | requirements for urban buses |
| USA | United States of America |

# Contents

# Executive summary

**Purpose and context of research**

A wide range of approaches are currently used for measuring performance by the New Zealand public transport sector. Regional public transport authorities (PTAs), government agencies, public transport operators and infrastructure providers all use various measures to help manage and deliver the public transport system and track performance against policy objectives. There is an opportunity for a nationally-consistent and comprehensive approach to how performance is measured, which could contribute to system improvement, better value for money, and sector learning about successful approaches to service delivery and achieving system outcomes.

There is also an opportunity for increased 'vertical integration' of measures; that is, consistent use of measures by different organisations, across different geographic scales of analysis and across different measurement purposes. Consistent use and definition of measures, for purposes ranging from monitoring everyday public transport operations through to assessing performance of public transport in contributing to strategic policy objectives, offers potential for more efficient data collection, analysis and reporting by the sector.

**Scope and method**

Through this research, we sought to identify best-practice approaches to public transport performance measurement, evaluate the effectiveness of current practice, and recommend a comprehensive measurement approach that could be meaningfully applied to the New Zealand sector. We undertook a review of international literature and practice to understand best practice. We also reviewed current New Zealand practice, informed by engagement with PTAs, operators and government agencies. We then developed a recommended organising framework for the measures and populated this with a suite of measures covering key performance elements, a smaller subset of which were identified as 'headline' measures. Measures were selected from a long list of potential measures based on the review of international and local literature and practice. They were chosen to be intuitively understandable by a broad audience, feasible to collect, reflect important elements of system performance and be relevant to the New Zealand context.

Our framework focuses on measures for monitoring ongoing system operations (services and infrastructure), rather than measures to inform decision-making on individual public transport investment proposals. It identifies a range of measures but not accompanying targets or performance standards. The framework is designed to be applicable to New Zealand's core public transport system (ie, the services and infrastructure managed by public sector organisations and eligible for government funding assistance) and is not intended for monitoring passenger transport delivered on a commercial basis (eg, long-distance passenger rail or coach services). This is consistent with the definition of public transport service in the Land Transport Management Act 2003 (Section 5).

**Findings from review of literature and practice**

We reviewed literature on approaches to measuring public transport performance. A key message from the literature is that public transport customers, operators, funders, policy-makers and the broader community, each have differing perspectives on what constitutes good performance and what is of interest to be measured. Comprehensive measurement frameworks incorporate a range of measures covering all of these perspectives. The literature also suggests that performance from the customer perspective needs to be central, but that historically measurement practices have been more operationally oriented. For example, measures of service reliability may be based on on-time departure from the first stop in a route, which is a

relevant operational measure but may not reflect customer experience of service reliability, which will depend on on-time performance throughout the route.

We reviewed several examples of guidance on measurement frameworks and international case studies of practice by public transport agencies, operators and organisations with policy oversight of the sector. We found that all frameworks organised a range of measures (typically 20 to 40) into categories to help communicate the breadth of factors contributing to performance. All frameworks included measures of the quality of service delivered from a customer perspective (eg, service reliability and comfort) and most measured passenger demand (eg, number of boardings). Some frameworks measured aspects of service availability or provision (eg, extent of network coverage), efficiency (eg, operating cost per boarding), and broader outcomes (eg, environmental and social impacts). Measures of infrastructure (eg, quality of stops or stations) were less common.

We also documented current New Zealand public transport measurement approaches and identified gaps relative to best practice. Several measures are well-established, reported in a consistent way by most PTAs, and used by the NZ Transport Agency Waka Kotahi (NZTA) for system oversight. These include, for example, measures of passenger boardings, passenger kilometres, service kilometres operated and fare revenue. Another set of measures is commonly reported on, but with more variation in the definition and level of detail provided; for example, measures of service reliability, punctuality and various financial measures. These commonly reported measures are reasonably consistent with those we identified as commonly used internationally through our review of case study public transport agencies.

There are gaps in measurement practices, with some important performance measures only being reported by some PTAs, and some areas of measurement where there are very different approaches to calculating similar factors. For example, measures of network coverage (eg, population within a certain distance threshold of public transport services) and levels of access provided by public transport (eg, proportion of jobs accessible within certain travel time thresholds) are only calculated by some PTAs and have a range of definitions.

Some aspects of service quality are infrequently measured, for example on-board comfort factors, such as crowding. This may reflect the New Zealand context where crowding is generally only an issue in major urban centres or associated with peak-period school-related demand. Infrastructure factors are also infrequently measured (eg, measures of public transport facilities or running way quality and provision). This may reflect that infrastructure factors change relatively infrequently, and are therefore less relevant for ongoing measurement, and also that responsibility for public transport infrastructure often sits with organisations separate to PTAs. There are no consistently used measures of cost efficiency (eg, measures such as operating cost per passenger kilometre). The NZTA has identified gaps and data availability issues in measures collated nationally and available for its national oversight function. For example, current measures used to assess public transport infrastructure performance are seen as inadequate.

Our engagement with PTAs and operators found general enthusiasm for a more nationally consistent approach to performance measurement and more clarity on measure definitions, although this was tempered by recognition of the wide diversity of contexts and views that measures need to be locally relevant (eg, across large metropolitan contexts and smaller systems operating in regional contexts).

**Recommended measurement framework**

Our proposed framework includes two key components: an organising logic for measures and a suite of measures that populate the framework.

We experimented with multiple organising logics and recommend a structure organised by two factors: a set of four key purposes for which measures are used and a set of eight measure categories (with 29 subcategories).

The four purposes identify relevant measures for distinct functions .

A. Monitoring public transport operators (with measures included, for example, in operating contracts).

B. Planning and managing public transport system delivery (with measures included, for example, in PTA monthly reporting to council committees).

C. Providing regional oversight of the transport system (with measures included, for example, in longer term council planning documents, such as annual plans and regional public transport plans).

D. Providing national oversight of the transport system (with measures included, for example in the NZTA's annual statement of intent).

The eight measure categories and 29 subcategories communicate the breadth of elements that contribute to public transport performance, and differentiate between inputs, system delivery outputs and high-level outcomes.

The 79 measures that populate the framework cover the main elements that contribute to public transport performance from a range of perspectives. The recommended measures have been identified through the literature and practice review and build on existing New Zealand practice. While there is a wider range of potential measures, those selected meet the criteria of being understandable and feasible, reflecting important performance elements, and being relevant to the New Zealand context.

A subset of 30 measures are identified as core 'headline' measures, which are the most important measures that collectively provide a snapshot of overall performance. Headline measures are identified for each of the four measurement purposes in the framework, and, as much as possible, are kept consistent across the purposes for which they are relevant. The headline measures are listed in Table ES.1.

Table ES.1    Headline measures*

| Measure category | Key purpose for performance measurement | | | |
| --- | --- | --- | --- | --- |
| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
| 1. Financial | | Comprehensive financial reporting, private share | | |
| 2. Network | | | Service provision: scheduled capacity kilometres | |
| 3. Fleet and workforce | Workforce: actual as percentage of target | | | |
| 4. Infrastructure | | | Kilometres of bus lane, special vehicle lane or railway line in passenger service. | |
| 5. Customer experience | | Travel time: operating speed | | |
| | Reliability: operated (or cancelled) trips; on-time departure and arrival | | | |
| | Reliability: headway regularity | | | |
| | Reliability: on-time departure; on-time satisfaction | | | |
| | Comfort: vehicle comfort satisfaction | | | |
| | | Comfort: stops, stations, terminals quality | | |

| Measure category | Key purpose for performance measurement | | | |
|---|---|---|---|---|
| | **A. Monitoring public transport operators** | **B. Planning and managing public transport system delivery** | **C. Providing regional oversight of the transport system** | **D. Providing national oversight of the transport system** |
| | Safety and security: safety and security satisfaction | | | |
| | Overall experience: overall trip satisfaction | | | |
| | Overall experience: number of complaints | | | |
| 6. Service use | | Passenger demand: boardings; passenger kilometres | | |
| | | | Mode share: public transport mode share | |
| 7. Efficiency | | Utilisation: passenger kilometres as percentage of capacity kilometres | | |
| | | Cost-efficiency: operating cost per unit of capacity kilometres | | |
| 8. Transport system outcomes | | | Economic prosperity: public transport access to jobs | |
| | | | Inclusive access: public transport access to activity centre | |

Note: *The headline measures are a subset of the full range of measures included in the framework; the full range is provided in Appendix C.

Our measurement framework seeks to build on existing New Zealand practice. Nevertheless, we do recommend several new or modified measures that we consider will have value for the sector. These recommended new measures include the following.

- Measures of network structure and service provision, which address gaps in current practice for descriptors of the levels of public transport service provided that can contribute to benchmarking between regions.
- Expanded measures related to workforce (ie, frontline public transport operational staff such as bus drivers), building on work currently underway by NZTA and addressing the importance of workforce availability in ensuring that service is delivered.
- Measures of public transport operating speed, reflecting that travel time (which operating speed influences) is an important contributor to customer experience and that problems with operating speed can signal the need for infrastructure improvements.
- Measures of reliability that clarify definitions and introduce a new measure of 'headway regularity' to address deficiencies in current measures for measuring the customer experience of reliability for more frequent services. We use the term 'reliability' in our framework to describe an overarching category of measures within which sit a range of measures including those currently termed 'punctuality' (on-time performance) and 'reliability' (the extent to which services operate at all). This means redefining the way that the term 'reliability' is used compared with current practice.
- Measures of efficiency, seeking more consistency across the sector and introducing new measures that allow for cross-modal comparison by taking account of different passenger capacities of vehicles and modes.
- Measures of public transport access and service coverage, with clearer definitions that ensure increased consistency and allow for inter-regional benchmarking.

**Implementing a new measurement framework**

While we have identified a coherent and logical measurement framework, there are multiple alternative ways in which a framework could be organised and an even wider range of specific measures that could populate our measure categories. The research is intended to inform development of improved measurement practices by the New Zealand public transport sector, and any framework that might be implemented by the sector could entail further evolution of what is recommended. We expect that any such process would involve further collaboration and engagement between key sector participants, including operators, PTAs, and relevant government agencies.

Opportunities for 'vertical integration' in the use of measures across the sector is a key objective of this research. Achieving increased consistency in practice will require careful implementation of any new measurement framework across a decentralised sector. There are several methods to support this, including the following.

- NZTA guidance on measurement for PTAs, potentially including mandated approaches, building on recent strengthened guidance to the sector.

- Use of centralised data processing to automate measurement, which would minimise the burden on PTAs and ensure that measures are calculated in a consistent way across the country. For example, the imminent introduction of the national ticketing system provides a clear opportunity for increased central collation of data related to public transport service use, which could allow some measures, such as boardings and passenger kilometres, to be centrally calculated and disseminated.

- Development of centrally managed tools to calculate more complex measures, such as those that rely on geographic information system (GIS) analysis (eg, service coverage and public transport access), which would similarly minimise the burden on PTAs and ensure consistency.

- Training and knowledge-sharing across the sector that helps communicate the value of enhanced measurement processes and assists in managing analytic and data collection efforts.

Our recommended set of measures supplements those in common existing use, including measures from customer and community surveys, measures of patronage and passenger kilometres, and some measures of service reliability. Where we have recommended measures that are not in common use, we have prioritised those that are feasible to collect and sought to limit the range of data sources required.

Most recommended measures can be derived from a reasonably small number of data sources, for example, customer and community surveys (already established in existing practice), ticketing data, and vehicle tracking data that is increasingly available. Several of the measures will rely on comprehensive data collection and record keeping by PTAs, operators and infrastructure providers, and some of the more complex measures involve combination of multiple data sources and analytic tools such as GIS. While implementing the framework could require more effort in collating data, analysis and reporting, there is potential for considerable value from more informed sector decision-making, leading to better outcomes for public transport customers, agencies, funders and the broader community.

# Abstract

A wide range of approaches is currently used for measuring performance by the New Zealand public transport sector. This research seeks to identify a measurement approach that can be meaningfully applied at a national, regional and local level, including an organising logic for measures and a suite of recommended specific measures that can be used for a range of purposes. The framework is intended to provide clearer insights into opportunities for public transport system improvement, and assist in sector learning about successful approaches to service delivery and achieving system outcomes.

The research reviews international best-practice approaches to public transport performance measurement and evaluates the effectiveness of current New Zealand practice. It then recommends a new organising framework for measures and populates this with a suite of recommended measures. The measures have been selected to be intuitively understandable by a broad audience, feasible to collect, to reflect important elements of system performance, and be relevant to the New Zealand context. The research also identifies methods by which a new measurement framework could be implemented, along with likely challenges, and recommendations for improving performance measurement practices.

# 1    Introduction

## 1.1    Background

In 2024, the NZ Transport Agency Waka Kotahi (NZTA) engaged Stantec to undertake sector research into public transport performance measurement. The research was conducted between August 2024 and February 2025.

The public transport community has identified several issues with current approaches to performance measurement that the research seeks to address. These include the lack of:

- a nationally consistent approach to public transport measurement in New Zealand
- a suite of best-practice measures that can be useful at all tiers of measurement
- a consistent organising logic for measures
- an agreed definition for many existing measures.

New Zealand public transport delivery is decentralised among regional public transport authorities (PTAs), which use different sets of measures to monitor public transport performance. Across the sector, some measures are defined inconsistently (eg, differing measures of reliability), which makes national, inter-regional, intra-regional, inter-modal and inter-operator benchmarking and reporting difficult. A more consistent measurement approach could allow better comparison between networks and provide insight into best practice and opportunities for improvement, which could assist in delivery of a better system and improved value for money.

Measures are used in the sector for monitoring and oversight at several different levels, and for different purposes, from monitoring operational contracts, to planning and managing system delivery, and monitoring achievement of high-level transport outcomes. There is opportunity for increased 'vertical integration' across these different purposes for which measures are used. For example, more consistent use of measures may result in more efficient measurement practices and create opportunities for improved benchmarking accuracy.

Performance measurement and oversight not only takes place at the regional level, but also at the national level, where NZTA has a statutory function to provide oversight of the public transport system. This is affected by the lack of a nationally consistent performance measurement approach and creates challenges for NZTA in identifying and addressing problems with public transport service delivery, public transport investment prioritisation, and accountability of public transport as a publicly funded service.

## 1.2    Research purpose

The overall purpose of the research was to identify a public transport measurement approach that could be meaningfully applied at a national, regional and local level. It is expected that the recommended measurement approach will be used to inform NZTA guidance to the New Zealand public transport sector and NZTA's own use of measures in overseeing the sector.

The research objectives were to:

- develop a public transport measurement approach that:
  - facilitates the delivery of key public transport outcomes by clearly defining and applying measures relevant for the entire public transport system
  - concentrates investment in the right places, supported by measures ensuring value for money and accountability

- supports the continuous improvement cycle, harnessing a feedback loop from delivery of service, operations, and customer satisfaction through to improvements to planning, funding, procurement and delivery
- considers how measures can be applied across dimensions, including:
  - regions, contracts and services
  - urban areas of differing size (ie, major, large, medium, small, rural and hinterland)
  - network layers (ie, urban, regional and national)
  - network outcomes (ie, patronage and coverage)
- provides for measures that can be consistently used for monitoring, from delivery and operations through to the system level
- identifies gaps in existing measures for public transport performance, and suggests improvements and alternatives
- identifies gaps in data-collection methods.

## 1.3 Research scope

### 1.3.1 Key research tasks

This research report:

- reviews international literature and practice, along with current New Zealand practice, and recommends a best-practice suite of public transport measures
- organises the recommended measures in a logical structure that is vertically integrated, from outcomes to operations, and is consistent with the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f)
- identifies and suggests improvements and alternatives to existing measures
- identifies where additional measures are required
- identifies necessary data sources to support the measures.

### 1.3.2 Scope clarifications

We focus on measures that are relevant to the New Zealand context and can be used for monitoring and reporting within a standardised measurement framework. These would be expected to form the core of a monitoring regime but might be supplemented where more detail is required by PTAs, for example for workforce monitoring within operating contracts.

We focus on the performance measures themselves, not on the targets or performance standards that often accompany measures. For example, our focus is on defining how reliability should be measured by the sector, not the level of reliability that the sector should aim to achieve.

We focus on defining measures sufficiently to enable them to be applied; not the detailed methods by which data should be collected to inform these measures. For example, even reasonably straightforward measures, such as public transport boardings, can involve complex data collection and analysis processes. Our recommendations on measures consider the availability of data sources, and the analytical effort required in using data to obtain measures and consistently calculate measures, but our research does not seek to inform or guide data collection and analysis processes.

We focus on giving the recommended measures a place and purpose within the organising framework, not on the associated monitoring and reporting methods for tracking performance against the measures. While we do consider the relevant frequency at which indicators are reported, we do not detail the broader range of factors that should contribute to effective monitoring and reporting of measures.

We focus on monitoring performance of the 'core public transport system', which we define as all passenger transport services (and their supporting infrastructure) that are contracted to PTAs or that have significant patronage, subsidy and importance to the network, including urban bus, rail, ferry and on-demand services, and relevant inter-regional services (eg, the Te Huia rail passenger service). This is consistent with the definition of public transport services provided in section 5 and part 5 of the Land Transport Management Act 2003. Several other types of passenger transport services receive public investment or financial assistance, such as total mobility services, school bus services (funded through the Ministry of Education), and other subsidised urban public transport that is not funded by PTAs (eg, Wellington City Council cable car). We do not develop a measures framework for these types of services, although some measures may be relevant to them. The framework is not intended for measuring performance of passenger transport services that operate on a purely commercial basis, including long-distance passenger rail, coach and air services, and some urban services.

We focus on a framework that can be used for monitoring ongoing system operations (services and infrastructure), rather than on developing a framework to inform decision-making on individual public transport investment proposals (eg, service enhancements or new infrastructure). Measures to inform individual project decision-making are established in documentation such as NZTA's *Monetised Benefits and Costs Manual* (2025g) and *Land Transport Benefits Framework* (2025f). Some measures identified by this research may be relevant to project-level investment decision-making, but the primary intention of the framework in relation to investment decision-making is that it is applicable to monitoring broader-scale investment performance (eg, outcomes arising from system-level investment over the medium to long term, rather than measuring outcomes of individual projects).

## 1.4    Research approach overview

The research was undertaken in four phases.

- Phase 1: review of literature and practice. This phase aimed to gather information about current practice in New Zealand and internationally, and international guidance that constitutes best practice for public transport performance measurement. It also involved developing a database of potential measures that could be included in a framework.

- Phase 2: identification of gaps in current practice and opportunities for enhancement. This phase built on phase 1 to identify how current New Zealand practice compares with international best practice, and used findings from engagement with the sector to identify the strengths and weaknesses of current practice. It involved developing a long list of potential new and modified measures that could be used in a New Zealand context.

- Phase 3: development of organising framework for measures. This phase involved testing various approaches to organising performance measures, and the applicability and potential for integrating measures across different levels of sector oversight (eg, measures for local monitoring of operator contracts and measures for national-level monitoring of high-level transport outcomes).

- Phase 4: selection and definition of specific measures to populate framework. This phase involved assessing the long list of potential measures developed at phase 2 to select recommended measures to populate the framework categories established at phase 3.

The process included structured engagement with PTAs and public transport operators to inform phases 1 and 2. This involved a series of interviews to which representatives of all PTAs were invited, and interviews with representatives from bus, ferry and rail operators. A summary of the engagement process is included in Appendix A.

Relevant NZTA staff were engaged throughout the research process, to understand current guidance on measurement practices and sector needs for a more comprehensive and consistent public transport measurement framework.

The emerging findings were tested with the project steering group and peer reviewers at key points in the research process.

## 1.5    Structure of this report

This report is structured as follows.

- Chapter 2: Review of international literature and practice. This reports on our review of international academic and policy literature relevant to measuring public transport performance. It also reports on case studies of measurement frameworks being used in practice in selected jurisdictions, with the aim of identifying approaches to measurement applicable in a New Zealand context.

- Chapter 3: Current policy and practice in New Zealand. This summarises the current policy context relevant to measuring public transport performance in New Zealand, the various purposes for which measurement is undertaken and how PTAs, NZTA and operators are currently measuring performance. It draws on findings from the engagement process and identifies strengths and weaknesses of existing New Zealand practice, and allowed us to understand the potential to apply practices used internationally.

- Chapter 4: Organising framework for measures. This reports on the process of developing an organising framework for structuring a set of recommended measures. It summarises how we identified and tested various frameworks and arrived at a recommended framework. It explains how we selected the measure categories and key purposes for measure application in our framework.

- Chapter 5: Selecting measures. This reports on the process used to select a suite of specific measures that populate the measure categories in our framework. It reports on assessment of potential measures for each subcategory in our framework, based on measures identified in literature and in practice. It identifies a recommended suite of measures for inclusion in the framework.

- Chapter 6: Applying and implementing a new measures framework. This identifies how measures can be applied across four key purposes for which PTAs, NZTA and other government agencies use public transport measures (monitoring operators, planning and managing system delivery, regional system oversight and national system oversight). It includes considerations and recommendations for implementing a new measures framework within the context of New Zealand's decentralised structure for delivering public transport services. It highlights several opportunities for ensuring that a new framework can be feasibly implemented.

- Chapter 7: Conclusions. This outlines considerations around implementation, opportunities for centralisation and recommendations for further investigations.

# 2    Review of international literature and practice

This chapter reports on findings from our review of international literature and practice relevant to measuring public transport performance. We reviewed literature and case studies of international practice with the aim of understanding best practice for measuring public transport system performance, and of identifying specific types of measures and organising frameworks for measurement systems that may be applicable to New Zealand. The section first outlines our approach to the review, briefly discusses New Zealand literature, then reports on key themes from the international literature, before turning to case studies of measurement practices in selected jurisdictions.

## 2.1    Approach to review

We conducted a review of international academic and policy literature. We searched for literature using keyword searches in academic and general search engines. Example key word searches included 'public transport performance measures', 'transit performance indicators', 'public transport benchmarking' and 'public transport system monitoring'. Our search returned the following types of literature:

- academic journal articles
- government policy and reporting documents
- reports from industry and sector non-government organisations (eg, guidance on performance measurement systems).

We scanned the literature for relevance and reviewed selected literature in more detail. Our focus was on literature concerned with the practical application of measurement approaches to public transport systems, generally in high-income jurisdictions with established public transport systems. We focused specifically on literature related to public transport sector measurement, rather than the broader literature on measurement systems for the public sector and the use of indicators to monitor private sector or industry performance.

Accompanying the literature review, we reviewed current approaches to the practice of public transport performance measurement in selected jurisdictions. The purpose of these case studies was to understand how measurement systems are structured and are being used in practice (as opposed to guidance on best practice that was the focus of the literature). We undertook case studies with the aim of identifying opportunities for improvement in New Zealand.

We selected jurisdictions with advanced public transport systems in relatively high-income contexts, including from the United Kingdom, Hong Kong, Canada, Australia, the United States of America (USA), and the Netherlands (a non-English-speaking jurisdiction). We focused on case studies of measurement practices undertaken by public transport agencies that generally operate at the scale of the urban metropolitan region. Our review scanned publicly available published information on measurement systems, such as performance monitoring reports and dashboards.

## 2.2    New Zealand literature

This chapter focuses on international literature and practice to help understand global best practice for public transport performance measurement. While our literature review did include New Zealand literature, we did not find local literature on comprehensive or holistic approaches to measuring public transport system performance (other than the literature associated with existing New Zealand practice that is covered in Chapter 3). Nevertheless, we did identify New Zealand literature concerned with various specific aspects of public transport performance measurement and measurement approaches for the broader transport sector.

This subsection briefly summarises this literature. Some of this is used further in Chapter 5 in discussing the literature on specific measure topics.

Algera (2020) reviews the performance measurement systems used by the Ministry of Transport and NZTA to monitor the New Zealand transport sector, as part of a review of performance measurement in New Zealand's construction sector. The review is focused on measurement practices across the multi-modal transport sector, rather than for public transport specifically. Key findings from their evaluation of current practice that are relevant to public transport measurement include:

- the importance of measuring 'outcomes' rather than 'outputs' or 'activities' (eg, measuring how easy is it for a customer to reach a certain destination rather than measuring kilometres of road built), noting that output-type measures are more established in the sector and that measuring outcomes can be more complex and suffer from data-availability challenges
- the importance of framing measures in the sector in a 'customer-centric' way that measures what really matters for customers; this includes acknowledging different customer groups with different needs, and measuring the usability rather than simply the 'availability' of transport for more vulnerable groups
- the features of effective measures, namely simplicity, transparency, being part of a balanced indicator set, measuring positive outcomes and involving data that is practically available.

Several studies have been concerned with more specific measures relevant to public transport monitoring. For example, the strengths and weaknesses of various measures for understanding public transport reliability in a New Zealand context have been discussed by Vincent (2008), Ian Wallis Associates and TAS Partnership (2013), and Rashidi et al. (2018). These are further discussed in Section 5.6.3 of this report, which discusses reliability measures in detail.

Mavoa et al. (2012) and Abley and Halden (2013) discuss approaches to measuring access in New Zealand. While concerned with multi-modal access, the indicators and techniques discussed are relevant to measures of access provided by public transport. O'Fallon (2010) proposes approaches to auditing the level of accessibility (eg, physical accessibility of stops and stations) provided by public transport in New Zealand. Ian Wallis Associates (2023) uses various approaches to measuring public transport operating and capital costs in New Zealand, as well as measures of cost-efficiency and vehicle utilisation as part of research to inform the Ministry of Transport's domestic transport costs and charges study.

The remainder of this chapter deals with international literature on comprehensive approaches to public transport performance measurement and case studies of international practice.

## 2.3　Key themes from the literature

### 2.3.1　Measuring performance from different perspectives and for different purposes

In general terms, measures or indicators for public transport systems are established and monitored to gather information about how the system is performing. Kittleson & Associates et al. (2003) note that public transport system operations can generate vast quantities of data and measurement systems are developed to make sense of this data. They identify two broad purposes for measuring performance:

- informing self-improvement by public transport service delivery agencies (eg, identifying shortcomings in service, effects of actions previously taken, benchmarking against comparator agencies and whether goals are being met)
- communicating results (eg, information to support decisions by elected officials or communications to the public about the value of services being provided).

Kittleson & Associates et al. (2003) highlight that the specific purposes of measures, and what constitutes public transport system 'performance' and is of interest to be measured, depends on the perspective from which the public transport system is viewed. They identify four key perspectives, each with different interests on what constitutes 'good performance' and accompanying interests in different types of measures:

- customer
- community
- agency
- vehicle or driver.

The customer perspective is interested in measures of the availability, comfort and convenience of service. The broader community is interested in the wider positive impacts and costs of public transport. The agency will share the interests of the customer and community, but will also have interests in measures of efficiency and effectiveness in achieving organisational goals. From the vehicle or driver perspective, there is an interest in measures of vehicle speed and reliability.

The Commonwealth of Australia's (2021) *Australian Transport Assessment and Planning Guidelines* also highlights the importance of 'perspectives' from which to view public transport performance, with each perspective having an interest in different types of measures, including:

- measures relevant to government authorities in their roles as funders and regulators
- measures relevant to operators from the perspective of adherence to operator contracts, and penalty and incentive regimes
- measures relevant to users and user organisations (customers and groups representing customers with specific needs, eg, accessibility difficulties).

A common theme in the literature is the importance of performance measures from a customer perspective. Anderson et al. (2013) argue that historically public transport operator agencies have been focused on operational rather than customer-oriented measures, and that this bias continues despite positive shifts toward measuring public transport convenience and service quality, partly driven by increased availability of new technologies that make new types of measures more feasible. They suggest that what constitutes relevant aspects of service quality for customers remains undefined in the sector, and argue that a broad range of attributes is important and all should ideally be measured for effective management. For example, they contrast commonly used indicators of on-time service performance with more customer-oriented indicators of reliability that measure lost customer time.

The European Committee for Standardization's (2002) standard for public passenger transport service quality definition, targeting and measurement (Standard EN13816) aims to focus the attention of public transport service providers on customers' needs and expectations by defining a set of quality criteria, which have been developed using the concept of the 'service quality loop', as illustrated in Figure 2.1. The concept highlights the distinction between the perspectives of the service provider and the customer in evaluating performance, and the need for multiple measures to reflect both perspectives.

**Figure 2.1    Service quality loop (reprinted from European Committee for Standardization, 2002, p. 6)**
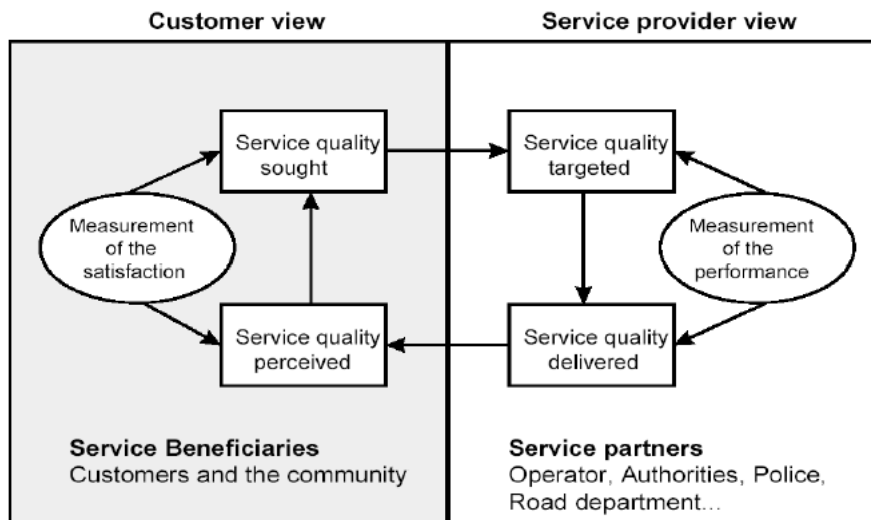


Kittleson & Associates et al. (2003) also note the importance of customer satisfaction as part of an effective public transport measurement system. They discuss how performance measurement in the private sector has shifted since the 1980s, from a focus on 'revenue and cost' and 'system and change monitoring' measures towards an increased emphasis on customer satisfaction measures; a shift they see as relevant to the public transport sector.

Diana and Daraio (2010) see the importance of public transport measurement systems distinguishing between the needs of public funding agencies, service operators and service users (or customers). They argue that the sector often does not articulate how measures relate to these three different actors and their respective interests. Further, they suggest that while measures of interest to operators (efficiency and effectiveness indicators) and customer experience are now well-developed, what is often missing in current practice is measures relevant to the perspective of policy- and decision-makers. While relevant measures for decision-makers will depend on political objectives, they suggest that more attention should be given to indicators of how public transport system performance contributes to accessibility improvement, modal diversion and environmental impact.

## 2.3.2    Frameworks for public transport performance measurement

The literature includes several instances of guidance for developing a holistic public transport performance measurement system or framework.

Both Kittleson & Associates et al. (2003) and Henning et al. (2011) suggest that the starting point for an agency developing a public transport performance measurement framework involves clarifying the organisation's strategic objectives. Consistent with the literature's discussion of differing perspectives within the sector and the accompanying different measurement interests, the design of any framework will depend on what the measuring organisation is trying to achieve.

Kittleson & Associates et al. (2003) and Henning et al. (2011) both position development of a public transport performance management system within a broader programme management process that involves not just defining a suite of measures, but also building stakeholder support for the measurement system and implementing monitoring and reporting processes that integrate the system with decision-making. Kittleson & Associates et al. (2003) list eight steps in developing a public transport performance measurement system:

- define goals and objectives
- generate management support

- identify internal users, stakeholders and constraints

- select performance measures and develop consensus

- test and implement the programme

- monitor and report performance

- integrate results into agency decision-making

- review and update the programme.

Nakanishi and List (2000) identify key characteristics of an effective public transport performance measurement system as:

- stakeholder acceptance

- linkage to agency and community goals

- clarity

- reliability and credibility

- variety of measures

- number of measures

- level of detail

- flexibility

- realism of goals and targets

- timeliness

- integration into decision-making.

Kittleson & Associates et al. (2003) highlight several trade-offs that are needed in developing a measurement system including the variety, number and level of detail of measures included. While a broad variety of measures is useful for capturing the range of factors that are important for performance from different perspectives, this needs to be balanced against overwhelming audiences with too many measures and problems with the effectiveness of organisations monitoring too much information and attempting to achieve too many targets. The level of detail provided needs to be sufficient to identify key issues, but too much detail can make communication challenging.

The literature provides seven example approaches to defining holistic measurement frameworks for public transport systems. Common to all seven frameworks is grouping measures into categories. One framework (Kittleson & Associates et al., 2003) links these categories to different measurement perspectives.

Kittleson & Associates et al. (2003) provide a guidebook aimed at agencies developing a public transport performance measurement system. They identify approximately 400 individual measures designed to be used as a 'menu' of measures to be selected based on agency objectives. They organise measures into seven categories and identify a set of approximately 50 'core measures' that differ according to the size of the public transport delivery agency. They also link categories of measures with different sector perspectives (customer, agency, community, and vehicle or driver), as illustrated in Figure 2.2.

**Figure 2.2    Organising categories for public transport performance measures and links to different sector perspectives (reprinted from Kittleson & Associates et al., 2003, p. 6)**



The European Committee for Standardization's (2002) standard for public passenger transport service quality definition, targeting and measurement defines eight 'quality criteria' (level 1) accompanied by 30 level 2 subcategories and an even wider range of level 3 subcategories. These criteria and subcategories specify the attributes to be measured, but do not provide specific definitions for the measures.

Henning et al. (2011) develop a framework for enabling international benchmarking of urban public transport performance. They define 13 core indicators for measuring performance organised in five categories: public transport uptake, travel efficiency, accessibility, affordability, and quality of travel experience.

Green and Espada (2015) develop a level-of-service framework for all modes of transport using roads, including public transport. They identify five overarching level-of-service needs for public transport users and 15 measures that fit within these categories.

The National Association of Transportation Officials (2018) provide guidance on public transport performance measures that move beyond conventional practice: 'collecting standardized, vehicle-based data points that are missing many of the most pressing needs for riders' (p. 1). It identifies 18 measures organised in six categories.

The International Association of Public Transport and Walk21 Foundation (2019) identify a set of indicators for public transport performance with a focus on the integration of walking with public transport. They define a three-tier measures framework with four high-level categories and 33 individual indicators.

The International Bus Benchmarking Group (2023) uses a 'balanced scorecard approach' using six topics to organise 11 performance indicators for comparing bus operations across 13 cities internationally.

Table 2.1 summarises the categories used across the seven organising frameworks described above. It groups the various categories under broad themes to enable comparison with the coverage of measures. It shows that all frameworks include categories associated with service quality from a customer perspective. Many frameworks also measure broader social, economic and environmental impacts, and aspects of service provision, often organised under labels of 'availability' and 'accessibility'.

The breadth of measure categories included in these frameworks relates to their overall purpose. For example, the level-of-service framework developed by Green and Espada (2015) is focused on the user experience perspective, so some measures, such as passenger demand, are not relevant to this perspective. The International Bus Benchmarking Group (2023) framework is developed from an operator perspective, so it includes categories of indicators associated with internal operator organisational performance, but does not include indicators associated with describing the availability and accessibility of the overall network (service provision category), infrastructure quality or passenger demand. Kittleson & Associates et al. (2003) is perhaps most comprehensive in establishing a menu of indicators that is explicitly attempting to be relevant to multiple measurement perspectives.

**Table 2.1** **Comparing high-level categories for organising public transport performance measures across seven measurement frameworks**

| Category theme | Kittleson & Associates et al. (2003) | European Committee for Standardization (2002) | Henning et al. (2011) | Green and Espada (2015) | National Association of Transportation Officials (2018) | International Association of Public Transport and Walk21 Foundation (2019) | International Bus Benchmarking Group (2023) |
|---|---|---|---|---|---|---|---|
| Passenger demand | | | Uptake | | Moving people | Service demand | |
| Service provision | Availability<br>Paratransit | Availability<br>Accessibility | Accessibility | Access | | Connecting destinations | |
| Service quality | Service delivery<br>Travel time<br>Safety and security<br>Capacity<br>Comfort | Information<br>Time<br>Customer care<br>Comfort<br>Security | Travel efficiency<br>Travel experience (safety, security, comfort) | Mobility<br>Safety<br>Amenity<br>Information | Reliable travel<br>Systemic safety | Comfort and safety | Customer<br>Safety and security |
| Infrastructure quality | Maintenance and construction | | | | | | |
| Financial | Economic | | Affordability | | | | Financial |
| Broader impacts | Community<br>Economic | Environmental impact | | | Economic vitality<br>Vibrant public space | | Environment |
| Efficiency | Economic | | | | | | |
| Other | | | | | Walking and biking access | Support and engagement | Growth and learning<br>Internal processes |

### 2.3.3    Types of performance measures and qualities of effective measures

The literature also outlines the types of performance measures that may be included in organising frameworks and the attributes that make measures effective.

Kittleson & Associates et al. (2003) identify four broad types of public transport performance measures:

- individual measures
- ratios
- indexes
- level-of-service measures.

Individual measures concern something that can be directly measured (eg, passenger boardings or on-time services), which makes them often relatively easy to calculate and explain to audiences. The downside is that many individual measures are needed to present a comprehensive picture of performance.

Ratios involve dividing one measure by another (eg, operating cost per boarding) and are often used to enable standardisation and comparison.

Indexes combine results from a range of measures into a single measure (eg, an index of public transport service availability could combine measures of service frequency, coverage and capacity). Indexes are often developed with the aim of reducing the number of measures reported, while incorporating a wide range of critical factors that contribute to performance.

Level-of-service measures assign certain 'grades' (usually expressed on a scale of A to F) to specified ranges of measures. They measure performance from a user perspective, and have the advantages of simplifying the communication of measures to public and decision-making audiences. Green and Espada's (2015) framework for public transport levels of service provides an example of these types of measures, with the following showing how different levels of passenger information are defined.

- Level of service A/B: on-board and roadside traveller information, including reliable real-time traveller information, in addition to information on timetables, fares, directions and maps.
- Level of service C/D: on-board and roadside traveller information, in addition to information on timetables, fares, directions and maps; but no real-time traveller information.
- Level of service E/ F: limited, incomplete or missing traveller information on the roadside and no on-board traveller information on the transit vehicle.

The Commonwealth of Australia's (2021) *Australian Transport Assessment and Planning Guidelines: M1 Public Transport* discusses performance measures and notes that measures can describe a range of activities:

- process: measures the type of process policy or activity
- inputs: measures the resource invested or used by an activity
- outputs: measures the level and extent of activity
- outcomes: measures the end result.

The guidelines suggest outcome measures are preferable to output or input measures where available, as they better reflect effectiveness in achieving ultimate objectives.

Gleason and Barnum (1982) contend that public transport performance measurement systems should clearly distinguish between indicators of:

- productivity
- efficiency

- effectiveness
- equity.

They argue that measures of efficiency and effectiveness are often conflated. They see effectiveness measures as being about the extent to which an objective has been achieved ('doing the right thing'), while measures of efficiency are about the extent to which resources are used efficiently or economically ('doing things right'), which are often expressed as ratios of input to output. They argue that in current practice measures of efficiency are often incorrectly viewed as measures of effectiveness. For example, a measure showing high performance from an efficiency perspective (eg, low operating cost per passenger kilometre) may not reflect high performance from an effectiveness perspective for the agency's overall objectives. They caution that poor choices of indicators to inform decision-making can lead to biases or misleading information.

Measures of equity of performance are distinct again from efficiency, effectiveness or productivity indicators. Measures of equity concern the social distribution of performance across different social groups. Bhat et al. (2005) argue that public transport performance measurement systems should disaggregate the performance of public transport for different population subgroups and for different trip purposes, in the context of the importance of public transport in addressing problems of inequitable access to transport and opportunities.

The Commonwealth of Australia (2021) *Australian Transport Assessment and Planning Guidelines: M1 Public Transport* highlight the following characteristics as being desirable when formulating key performance indicators:

- be simple and easy to convey
- relate directly to the identified objectives
- relate to outcomes not outputs
- facilitate benefit measurement
- be measurable from a practical perspective
- reflect recognised performance measures.

The guidelines list example indicators relevant to assessing investment proposals (the subject of the guidelines), but do not attempt to provide a comprehensive framework of measures for ongoing monitoring of public transport system operations.

## 2.4    Case studies of international practice

### 2.4.1    Overview of case studies

International case studies from selected jurisdictions provide an indication of how measurement frameworks are applied in practice. We reviewed international practice by selecting a range of public transport sector organisations and assessing how they use and organise measures to report on performance.

The case study organisations are listed in Table 2.2. We selected organisations that have some functional responsibilities that overlap with those of PTAs in New Zealand (ie, managing urban public transport services and infrastructure). We also included some organisations that have direct public transport operations functions (eg, Mass Transit Railway Corporation (known as MTR) in Hong Kong) and the US Department of Transportation Federal Transit Administration, which  shares some similarities in function with NZTA in relation to public transport oversight. We note that institutional arrangements vary substantially across jurisdictions and none of the organisations have completely equivalent functions to New Zealand public transport operators, PTAs or NZTA.

We selected case studies from a range of global regions, focusing on relatively high-income jurisdictions with advanced public transport systems. We include some agencies from closely comparable Australian contexts, an agency from a non-anglosphere European context and a North American organisation.

**Table 2.2      Organisations selected as case studies of international practice**

| Organisation | Organisation's function relevant to public transport | Geographic scope of operations | Global region |
|---|---|---|---|
| Transport for London | Managing and operating multi-modal urban public transport services and infrastructure | London, United Kingdom | Europe |
| MTR Hong Kong | Managing and operating urban public transport services and infrastructure | Hong Kong, China, plus operator for some urban public transport systems globally (eg, London, Stockholm, Sydney) | East Asia, Europe, Australasia |
| TransLink Metro Vancouver | Managing multi-modal urban public transport services and infrastructure | Vancouver urban region, Canada | North America |
| Translink Queensland | Managing multi-modal public transport services | Queensland, Australia (state-wide) | Australasia |
| Transport for New South Wales | Managing multi-modal public transport services | New South Wales, Australia (state-wide) | Australasia |
| Nederlandse Spoorwegen | Operating passenger rail services | The Netherlands, plus operator for some regional passenger rail services in the United Kingdom | Europe |
| US Department of Transportation Federal Transit Administration | Providing oversight and funding for public transport throughout the USA, and collating data published through the national transit database | USA | North America |

Our review of these organisations' public transport performance measurement frameworks used documentation available to public audiences. Our review consequently focuses on how these organisations use and report on headline or core measures, rather than the more extensive and detailed measurement systems that may be used internally by organisations to assist in monitoring operations and decision-making.

## 2.4.2    Measurement frameworks in practice

The organisations that we reviewed use a range of reporting formats and ways of organising performance measures. Further details, including lists of specific measures, are included in Appendix B. Several use public-facing web-based dashboards as a way of presenting and organising data and measures (eg, TransLink Metro Vancouver and Translink Queensland). Many produce quarterly or annual reports that include key measures. Financial measures are generally reported through annual financial reports and accounts. Most organisations do not comprehensively collate all measures in a single location, although some, such as TransLink Metro Vancouver provide a more comprehensive and broad-ranging set of measures collated within a single framework.

Among the organisations that we reviewed, there is little commonality in the way that measures are organised (eg, the categories by which measures are grouped). Most organisations use measures derived from customer surveys to capture the customer perspective. All include measures of passenger demand that are of most direct interest to the provider or operator and the funder. Several also measure cost efficiency and financial performance that are most relevant to the provider or operator and funder. The US Department of Transportation Federal Transit Administration's national transit database has a heavy focus on financial and efficiency measures, possibly reflecting its interests as funder of public transport. Despite all the frameworks that we reviewed including measures relevant to multiple perspectives, none of the organisations explicitly organise their measurement frameworks by these different perspectives or interest groups.

The number of measures reported on through headline performance reporting formats varies across the organisations, but generally between 20 and 40 measures are reported. This number of measures possibly reflects a balance between being comprehensive while remaining legible and not overwhelming for audiences. TransLink Metro Vancouver's accountability centre (TransLink, 2025) is an example of a comprehensive measurement framework and includes approximately 35 measures organised by six categories. Transport for London's bus performance reporting (2025a) involves a more narrowly focused set of bus operations and customer satisfaction measures, and includes approximately 20 operational measures and a further 20 measures of elements of customer satisfaction.

### 2.4.3    Types of measures

Table 2.3 summarises example measures used by the case study organisations within the publicly available reporting material that we reviewed. The table is organised by the same eight measure categories used to collate information from our review of international literature in Section 2.3. More extensive lists of specific measures used by each organisation and their sources are included in Appendix B.

All organisations include some type of measure of passenger demand as a key performance indicator (eg, boardings, passenger trips or passenger kilometres). Measures of service provision, such as the extent of service provided or descriptors of the network available, are uncommon. All measurement frameworks include several measures of 'service quality'. The most common are measures of service reliability or punctuality. Within this category, safety performance measures and customer satisfaction measures are also common.

Measures of infrastructure quality are uncommon, possibly reflecting that public transport operating agencies may not be directly responsible for the infrastructure on which services run (eg, the roadways on which bus services run or railways on which train services run).

Financial and efficiency measures are uncommon in headline performance measurement frameworks, although all agencies will have some form of financial reporting that is usually separate from reporting on operational and customer performance.

Several agencies report on the broader impacts of their operations, with environmental impact indicators, including greenhouse gas emissions measures from public transport operations, being the most common. Some agencies report on workforce-related indicators, such as bus driver vacancies.

**Table 2.3    Example measures used by case study organisations**

| Measure category | Transport for London | MTR Hong Kong | TransLink Metro Vancouver | Translink Queensland | Transport for New South Wales | Nederlandse Spoorwegen | US Department of Transportation Federal Transit Administration |
|---|---|---|---|---|---|---|---|
| **Passenger demand** | Passenger kilometres<br>Journey stages | Passenger trips | Boardings | Passenger trips | Passenger trips | Passenger kilometres | Passenger trips<br>Passenger miles |
| **Service provision** | | | Service hours per capita | | | | Vehicle revenue miles |
| **Service quality** | % scheduled vehicle kilometres operated<br>Average excess wait (mins)<br>Customer satisfaction<br>Average bus speed | Number of passenger injuries per 100 million passenger trips | Customer injury rate<br>On-time departure<br>Customer satisfaction | On-time running<br>Passenger injuries<br>Customer experience | On-time running<br>Service cancellations<br>Customer satisfaction | Punctuality<br>Seating opportunity<br>Customer rating | Average speed<br>Fatality and injury rate (per vehicle revenue mile) |
| **Infrastructure quality** | | | Bus stop accessibility | | | | Station accessibility<br>Percentage of assets in good repair |
| **Financial** | Revenue by source and expenditure by category | Revenue by source and expenditure by category | Operational cost recovery | | | | Revenue by source and expenditure by category<br>Farebox recovery |
| **Broader impacts** | Public transport mode share | Greenhouse gas emissions | Greenhouse gas emissions<br>Air contaminant emissions | | | Energy and $CO_2$ per passenger kilometre | |

| Measure category | Transport for London | MTR Hong Kong | TransLink Metro Vancouver | Translink Queensland | Transport for New South Wales | Nederlandse Spoorwegen | US Department of Transportation Federal Transit Administration |
|---|---|---|---|---|---|---|---|
| **Efficiency** | | | Boardings per service hour<br>Cost per boarding | | | | Operating cost per trip/passenger mile |
| **Other** | | Voluntary staff turnover | | | Bus driver vacancies | | |

# 3 Current policy and practice in New Zealand

This chapter reviews current policy and practice relevant to public transport performance measurement in New Zealand. The review is organised by four purposes for which measures are used, and, for each purpose, covers common measures in use and our evaluation of current practice based on findings from engagement with PTAs and comparison with international literature and practice.

## 3.1 Approach to review

Our review involved the following:

- a desktop review of published information on public transport performance measurement policy and practice from PTAs and NZTA
- interviews with representatives from PTAs, public transport operators and NZTA to gather information about perceptions of current practice
- assessment of the strengths, weaknesses and opportunities of current New Zealand practice using information from the interviews and a review of international literature and practice.

The approach to interviews is summarised in Appendix A.

## 3.2 Policy framework for performance measurement

### 3.2.1 Organisational roles

Public transport delivery is decentralised in New Zealand, as noted in Section 1.1. A large number of organisations have roles within the sector, including central government entities (Ministry of Transport, NZTA and KiwiRail), local government entities (regional councils, territorial (or local) authorities and unitary authorities), and public transport operators, all of which are currently private sector organisations. Figure 3.1 outlines the organisations and their functions.

PTAs[2] have a central role within the sector, with responsibility for:

- planning public transport in their region
- contracting service delivery to operators (where services are integral to the network)
- providing passenger infrastructure or collaborating with territorial authorities to provide it
- providing on-road infrastructure or collaborating with road controlling authorities (RCAs) to provide it
- collaborating with KiwiRail to provide rail infrastructure
- co-funding public transport services and infrastructure with the NZTA
- managing the registry of exempt services (those that are not integral to the network).

Regional councils, unitary authorities, Auckland Transport and Invercargill City Council are PTAs, the latter under delegation from Southland Regional Council.

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[2] The term public transport authority (abbreviated here as PTA) is not defined in legislation, but is commonly used to describe organisations that have legal responsibilities for public transport, which is how it is consequently used in this report.

**Figure 3.1    New Zealand public transport sector participants, roles, and functions (reprinted from NZ Transport Agency Waka Kotahi, 2025c)**

**Minister of Transport**
- Initiates changes to transport legislation.
- Issues the government policy statement (GPS) on land transport under Part 3 of the Land Transport Management Act (LTMA).

**Government Policy Statement on land transport (GPS)**
- Sets out what government wishes to achieve through the allocation of funding from the National Land Transport Fund (NLTF).

**Ministry of Transport**
- Develops and executes strategy and policy in accordance with government direction, applying an all of transport focus across land, sea and air.

**New Zealand Transport Agency**
- Gives effect to the GPS on land transport.
- Allocates NLTF funding in accordance with GPS.
- Approves procurement procedures utilised by entities spending money from the NLTF.
- Has a statutory function under Part 4 of the LTMA to oversee the planning, operation, implementation, and delivery of public transport nationally.
- Issues guidelines for the development of Regional Public Transport Plans.
- Is a road controlling authority for state highways.
- Regulates vehicles and driver licensing, including for public transport.

**Unitarity authorities** have the combined functions of regional councils and territorial authorities (city and district councils).

**Regional Councils and Auckland Transport**
Also known as public transport authorities (PTAs).
- Develop Regional Land Transport Plans and Regional Public Transport Plans in accordance with LTMA and in consultation with communities.
- Plan public transport networks.
- Design, procure and fund public transport services.
- Provide enabling systems such as ticketing, real-time information and customer service functions.
- Influence land use via regional policy statements and regional plans developed in accordance with the Resource Management Act.

**Local authorities (city and district councils) and Auckland Transport**
- Develop integrated land-use and transport strategies. Are road controlling authorities for local roads.
- Typically provide and maintain infrastructure including for public transport such as bus stops, bus lanes ferry terminals and train stations.
- Develop district plans under the Resource Management Act and regulate land use.

**KiwiRail**
- Is a state-owned enterprise that owns and maintains New Zealand's rail network with funding from the NLTF, crown and track user charges.
- Coordinates use of the network.
- Operates freight services.
- In some cases, is a public transport operator and an exempt service provider.

**Public transport operators (PTOs)**
- Operate integral, exempt and excluded public transport services and typically employ the public transport workforce and provide and operate vehicles/vessels and enabling assets.

**Integral services and funding**
- Are delivered by or under contract with PTAs and are typically funded from passenger fares, the NLTF & local share funding apportioned at the applicable financial assistance rate.
Other funding sources include crown funding and 3rd party revenue like advertising on vehicles and infrastructure.

**Exempt services**
- Are operated independently without public subsidy.
Some exempt services must be registered with a regional councils to operate under the LTMA.

**Key**

| Relating to central government | Relating to local government | Relating to private entities | Additional considerations |

The NZTA also has a central role within the sector, with statutory responsibility for:

- overseeing the planning, operation, implementation and delivery of public transport
- managing funding of the land transport system, including public transport
- assisting, advising and cooperating with approved organisations
- delivering, or managing the delivery of, activities for ticketing systems and payments.

The NZTA's role includes issuing guidelines for regional public transport plans (RPTPs) (see Section 3.2.2.1), approving procurement procedures for subsided public transport and the approach to procurement for un-subsidised public transport, and sourcing information from PTAs.

Public transport operators similarly have a key role in the sector, delivering public transport services to customers, operating under contract to PTAs. The services that they deliver and their success at delivering them are at the forefront of the overall success of public transport.

Territorial authorities (city and district councils) and unitary authorities provide passenger infrastructure (typically in collaboration with PTAs and co-funding from NZTA), such as bus stops, ferry terminals and train stations, and road infrastructure, such as bus lanes and other public transport priority measures through their role as RCAs. KiwiRail provides platforms, tracks, signals and associated rail infrastructure in collaboration with the relevant PTAs. The Ministry of Transport's role relates primarily to higher level strategy and policy, including development of the government policy statement on land transport, which specifies funding ranges for National Land Transport Programme investment in public transport activity classes.

## 3.2.2    Sector legislation

The Land Transport Management Act 2003 and Local Government Act 2002 set statutory roles and processes for the public transport sector, particularly as they relate to performance monitoring.

### 3.2.2.1    Land Transport Management Act 2003

The Land Transport Management Act 2003 provides the legal framework for managing and funding land transport activities, including the planning, funding and regulatory requirements for public transport. It establishes the NZTA and defines its role, which includes regulatory, infrastructure, planning, investment management and general functions, and requires the agency to oversee and monitor activities within these functional areas, including the planning, operation, implementation and delivery of public transport.

The Land Transport Management Act places 'best value for money' requirements on all approved organisations that receive funding through the National Land Transport Programme via NZTA. The NZTA's *Procurement Manual for Activities Funded Through the National Land Transport Programme* (NZ Transport Agency Waka Kotahi, 2022) includes detailed public transport data, performance measure and customer satisfaction requirements relating to this.

The act requires PTAs to develop and adopt an RPTP if they intend to provide public transport services or provide subsidies or financial assistance. The RPTP serves as a statement of services that are integral to the public transport network, the policies and procedures that govern those services, and the information and infrastructure that support them. RPTPs must be reviewed every 3 years and renewed every 6 years, and must include policies on performance and on managing, monitoring and evaluating the performance of services.

### 3.2.2.2    Local Government Act 2002

The Local Government Act 2002 provides the framework within which local authorities (including PTAs) operate. It also sets out associated planning and reporting processes. Key to these is a requirement to

develop a long-term plan covering at least a 10-year period, which describes the activities of the organisation and the community outcomes they support, and provides for integrated decision-making and coordination of resources, a long-term focus for decisions and activities, and a basis for accountability to the community.

The Local Government Act 2002 is wide-ranging, but seeks to provide infrastructure, services and performance that are efficient, effective and appropriate to circumstances. To support this, the act requires that councils monitor their own performance and that of any council-controlled organisations. They must also ensure that, where delivery is undertaken by an entity other than that responsible for governance, there is a contract that sets out the service levels, performance measures and targets for the activity, and how performance will be assessed and reported. These requirements place monitoring and reporting requirements on the PTAs themselves and on any other organisations that deliver services for them, such as public transport operators.

## 3.3 Range of purposes for using public transport performance measures

We have identified four key purposes for which performance measures are used by the New Zealand public transport sector.

- **Monitoring public transport operators'** delivery of services through partnering contracts, including their adherence to contractual obligations.
- **Planning and managing public transport system delivery** (services and supporting infrastructure, at the regional scale) to inform short-term operational decision-making, service planning and benchmarking.
- **Providing regional oversight of the transport system** to inform medium-to-long-term regional-level planning and decision-making, and enable the achievement of regional-level policy objectives to be assessed (as defined, for example, through RPTPs and regional land transport plans).
- **Providing national oversight of the transport system** to inform national-level planning and decision-making and enable the achievement of national-level policy objectives to be assessed.

Table 3.1 summarises these four key purposes for which measures are used and the core documents within which measures are documented or reported on.

Table 3.1    Key purposes for public transport performance measures in New Zealand

|  | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
|---|---|---|---|---|
| Key agencies involved | PTAs monitoring private public-transport operators. | PTAs planning and managing service delivery and infrastructure performance.<br>RCAs and other infrastructure providers planning and managing supporting infrastructure. | PTAs, regional councils and regional transport committees overseeing public transport system performance and contribution to broader regional transport system outcomes. | NZTA, Ministry of Transport and other central government agencies overseeing public transport system performance and contribution to broader national transport system outcomes |

| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
|---|---|---|---|---|
| Measures inform | Penalties and rewards for operator performance.<br>Contract administration. | Short-to-medium-term service and network planning.<br>Short-term operational decision-making.<br>Inter-regional benchmarking.<br>Public communications. | Medium-to-long-term public transport and multi-modal planning.<br>Monitoring progress toward outcomes.<br>Public communications. | Inter-regional benchmarking of PTAs.<br>Investment decision-making.<br>Monitoring progress toward outcomes. |
| Measures documented and reported on within | Contracts between PTAs and operators. | Internal PTA reporting.<br>Regular reporting to governance groups.<br>Public-facing dashboards. | Annual reporting to governance groups (eg, on long-term plans, statements of intent).<br>Public transport and transport policy and plans (RPTP, regional land transport plans). | Reporting to governance groups, eg, through statements of intent or performance expectations, national public transport and transport policy and plans. |

## 3.4 Measures used for monitoring public transport operators

### 3.4.1 Current practice

Various measures are used by PTAs to assist their monitoring of public transport operator performance. General practice in New Zealand is that PTAs engage in 'partnering contracts' with private public-transport operators to provide bus, train, ferry or on-demand services. No PTAs currently operate their own services and would require NZTA approval to do so.

Measures and targets are embedded within these partnering contracts and inform bonus and penalty regimes to incentivise high performance from operators. Regular monitoring against these targets is an integral part of each PTA's role in administrating partnering contracts with operators.

PTAs generally receive funding assistance for contracting public transport services, funded through the National Land Transport Programme, which is administered by NZTA. NZTA's *Procurement Manual for Activities Funded Through the National Land Transport Programme* states that in regard to public transport: 'all partnering contracts are expected to contain a performance monitoring agreement' (NZ Transport Agency Waka Kotahi, 2022, p. 180) and provides guidance on the features of an effective agreement. It specifies seven measures as minimum requirements for inclusion in partnering contracts, as listed in Table 3.2. This information is required to be reported to NZTA by PTAs at various frequencies. However, our interviews with NZTA representatives found that PTAs do not consistently gather or report on the required data.

We note that these minimum measure requirements all involve measures of service quality, rather than other aspects of public transport performance (eg, infrastructure quality, efficiency). This reflects that the primary interest of PTAs in their oversight of operators is in ensuring high-quality service provision and measuring aspects of service performance that are in some way within the control of the operator.

PTAs also include a range of other measures and targets in their contracts, depending on the elements of performance they wish to prioritise. Our research did not review measures included in PTA contracts.

**Table 3.2 Minimum requirements for performance measures to be included in PTAs partnering contracts with operators (adapted from NZ Transport Agency Waka Kotahi, 2022, p. 180–181)**

| Attribute | Key performance measure | Parameters |
|---|---|---|
| Performance data to be reported quarterly by unit | | |
| Service performance | Service trip reliability (bus, ferry, train) | Disaggregated by peak and off-peak.<br>Percentage of scheduled service trips completed in full.<br>(Note that a service trip leaving the origin stop >59 seconds early or >9 minutes and 59 seconds late is deemed not to have operated). |
| | Cancelled service trips (bus, ferry, train) | Disaggregated by peak and off-peak.<br>Percentage of timetabled service trips that were cancelled. |
| | Service trip punctuality (bus, ferry, train):<br>• at trip start<br>• at destination (or enroute if required) | Disaggregated by peak and off-peak.<br>Percentage of scheduled service trips leaving origin stops between 59 seconds before and 4 minutes and 59 seconds after the scheduled departure time.<br>Performance of scheduled service trips between 59 seconds before and 4 minutes and 59 seconds after the scheduled departure time at the selected points. |
| Percentage data to be reported annually | | |
| Safety and security | Number of incidents | The maintenance of an up-to-date incident register, disaggregated by:<br>• nature (eg, criminal, anti-social)<br>• severity (eg, resulting in serious injury, nuisance).<br>(Note: Including the requirements of the Health and Safety at Work Act 2015 and the operator rating system.) |
| Complaints | Number of complaints received | Disaggregated by service attributes (eg, punctuality, vehicle cleanliness, comfort). |
| | Percentage of complaints responded to within 10 working days | |
| Performance data to be reported at least once every 3 years | | |
| Customer satisfaction | Customer satisfaction with the quality of public transport services | Approved organisations must use the specified standard survey when undertaking a survey of public transport customer satisfaction to ensure results are comparable across operators, modes and regions. |

### 3.4.2   Assessment of current practice

Our interviews with PTAs found they were generally comfortable with NZTA's minimum set of measures for inclusion in partnering contracts, but several opportunities for improvement were highlighted.

- Potential for consolidation of some of the service reliability and punctuality measures (eg, consolidation of current 'service trip reliability' and 'cancelled service trips' measures).

- Consideration of alternative measures that better reflected customer experience of service reliability, for example, measures that capture on-time performance of services at all stops, not just at the first and last stop of routes.

- Improvements to the customer satisfaction questionnaire.
- Opportunities for improved integration of measures used for contract monitoring with those used for other purposes and levels of oversight (ie, strengthened vertical integration of measures). Some PTAs reported that performance measurement processes for operator oversight and service delivery monitoring occurred in different teams within the same PTA organisation, reflecting different teams' functional responsibilities. In some cases this meant different teams measuring similar but slightly different elements of performance.

Our interviews with operator representatives found mixed views on the usefulness of measures currently used to monitor contracts and inform bonus and penalty regimes. Operators generally supported the concept of nationwide and inter-modal consistency in the measures collected, to enable benchmarking and support efficient data collection processes.

Some were comfortable with current practice, while others were concerned that contracts include too many data collection requirements, measures and targets. They suggested that expanding sets of measures and onerous target levels (eg, 100% reliability) have led to higher costs that get passed on to PTAs. They favoured a minimal set of measures that reduce compliance costs and focus on what matters. Some measures were viewed as challenging to estimate, due to data availability and analytical complexity (eg, carbon emissions for ferry operations), while others were viewed as being of limited usefulness (eg, organisational culture measures and detailed measures such as the number of CCTV cameras). They suggested caution in adding new measures into performance measurement frameworks and the need to ensure any measure collected has a direct link to decision-making and improving customer experience.

Some were concerned that current measures and targets were not appropriate for reflecting what is important for good customer experience. For example, some operator representatives suggested that the current punctuality measure is not relevant for high-frequency bus services where schedule adherence is less important than headway regularity for customer's experience of service reliability. Some suggested that customer complaints may not be a valid measure for operator contract monitoring, as complaints are dominated by instances where a customer's expectation is not met, but some operators were of the view that these customer expectations are not within their control.

Aligning with feedback from PTAs, some operator representatives also suggested that current 'service trip reliability and 'cancelled service trips' measures could be consolidated into a single measure.

Ferry operator representatives raised that the specifics of ferry operations, in comparison to bus and train modes, mean that there is some ambiguity in how to record punctuality. For example, it is unclear whether the time of service departure is the time that the passenger gate closes or the time that the gangway is removed, and the vessel leaves the wharf.

Some representatives identified an opportunity for more financial measures related to operator costs to enable NZTA to monitor value for money from public transport operators. For example, it was suggested that a measure of cost per service kilometre, which was collected and published consistently across all contracts, could enable benchmarking.

## 3.5 Measures used for planning and managing public transport system delivery

### 3.5.1 Current practice

A range of measures are used to monitor public transport system delivery. They generally involve measures that track operational performance and are reported on an ongoing and relatively frequent basis (eg, from daily to monthly).

PTAs are the key organisations that use measures for monitoring system delivery. Measures are reported in various formats, ranging from internal publication to inform service planning and operational management to public-facing online dashboards and regular reporting to bodies such as council committees.

Because PTAs receive co-funding via NZTA to contribute to delivery of public transport services, they are required to report to NZTA regularly regarding regional service delivery. Two main mechanisms are used for this reporting; 'annual achievement returns' and 'monthly achievement returns' (referred to in this report as 'monthly reporting requirements') (NZ Transport Agency Waka Kotahi, 2025d). These requirements contribute to structuring the way in which PTAs monitor system delivery (alongside PTAs own internal requirements and objectives for performance measurement).

In September 2024, NZTA released updated monthly reporting requirements for PTAs (NZ Transport Agency Waka Kotahi, 2024e). These include the measures summarised in Table 3.3.

**Table 3.3    Summary of monthly reporting requirements for PTAs (adapted from NZ Transport Agency Waka Kotahi, 2024e)**

| Measure | Detail | Aggregation |
|---------|--------|-------------|
| Patronage and fares | Boardings – number of passenger boardings including transfer boardings<br><br>Fare revenue – fares paid by passengers (excl. GST)<br><br>Passenger-kms – number of kilometres travelled by passengers | Region<br>Month<br>Mode<br>Unit<br>Concession type<br>Adult, infant, child (5–12 years), youth (13–18 years), youth (5–18 years, where breakdown is not available), under-25 years, senior concession<br>Community services cardholders, SuperGold cardholders, accessibility concession<br>Tertiary student, third-party (eg, employer), other<br>Payment type<br>Period (peak or off-peak based on SuperGold card hours) |
| Service performance | Scheduled trips<br>Operated trips<br>Depart on time<br>('On time' is services operated between 59 seconds before and 4 minutes and 59 seconds after the scheduled departure time)<br>Arrive on time<br>Reported cancellations | Region<br>Month<br>Mode<br>Unit – contracted units and exempt services that are integral to the public transport network |

| Measure | Detail | Aggregation |
|---|---|---|
| | Scheduled service kms<br>Service kms operated | |
| Total Mobility | Passenger trips<br>Hoist trips<br>Total fare<br>Fare paid<br>Fare subsidy<br>Hoist fee | Region<br>Month<br>Service area – name of community or town<br>Operator name – name of taxi company |
| Workforce and fleet | Workforce – number of full-time equivalent (FTE) staff<br>Actual establishment – total FTE staff available<br>Target establishment – total FTE staff required to deliver public transport services<br>Fleet<br>Bus type<br>Train type<br>Ferry type | Region<br>Month<br>Mode<br>Operator |
| Complaints and incidents | Complaints, categorised as: compliments, disruptions, information, infrastructure, network, operator, safety, ticketing, vehicle, other<br>Incidents, safety and security, categorised as: operations, other | Region<br>Month<br>Mode<br>Operator |

The information that PTAs report to NZTA through their monthly reporting spreadsheets is not made publicly available. NZTA has indicated that consistently collating accurate data from the information they request from all PTAs is challenging. Some PTAs publicly report on some of these measures using a range of methods including publishing monthly reports, online dashboards, and reports to boards and committees.

Table 3.4 outlines the measures included in regular published reports on public transport performance by three PTAs and includes NZTA's reporting requirements for comparison.

**Table 3.4     Snapshot of measures included in regular performance reporting by selected PTAs**

| Measure category | Auckland Transport (monthly patronage, customer satisfaction, statement of intent reporting) | Metlink Wellington (monthly performance reports) | Bay of Plenty Regional Council quarterly public transport performance monitoring (Bay of Plenty Regional Council, 2024) | NZTA monthly reporting requirements (NZ Transport Agency Waka Kotahi, 2024b) |
|---|---|---|---|---|
| Passenger demand | Passenger boardings | Passenger boardings<br>Passenger trips – Total Mobility | Passenger boardings<br>Passenger trips – Total Mobility<br>Mode share | Passenger boardings<br>Passenger kilometres<br>Passenger trips – Total Mobility<br>Hoist trips – Total Mobility |

| Measure category | Auckland Transport (monthly patronage, customer satisfaction, statement of intent reporting) | Metlink Wellington (monthly performance reports) | Bay of Plenty Regional Council quarterly public transport performance monitoring (Bay of Plenty Regional Council, 2024) | NZTA monthly reporting requirements (NZ Transport Agency Waka Kotahi, 2024b) |
|---|---|---|---|---|
| Service provision | | Workforce – bus drivers | Coverage – % of dwellings within 500m of frequent and all services <br><br> Access – % of jobs within 45 mins travel time from all dwellings | Fleet size <br> Scheduled trips <br> Operated trips <br> Scheduled service kms <br> Service km operated <br> Workforce – FTE |
| Service quality | Punctuality <br> Reliability <br> Customer satisfaction | Complaints <br> Punctuality <br> Reliability <br> Cancellations | Complaints <br> Reliability – on time performance, missed trips <br> Incidents <br> Customer satisfaction | Complaints <br> Depart on time <br> Arrive on time <br> Reported cancellations <br> Incidents |
| Infrastructure quality | | Network availability (rail) | | |
| Financial | Farebox recovery | Fare revenue | Operating revenue <br> Operating expenditure <br> Capital revenue <br> Capital expenditure <br> Farebox recovery | Farebox revenue <br> Total fare – Total Mobility <br> Fare paid – Total Mobility <br> Fare subsidy – Total Mobility <br> Hoist fee – Total Mobility |
| Impacts | Greenhouse gas emissions (Auckland Transport operational) | In service kms by engine type <br> $CO_2$ equivalent (bus operations) <br> Bus vehicles by engine type | Carbon emissions from PT fleet | Fleet by emission profile (eg, buses by Euro 4,5, trains by propulsion type) |
| Efficiency | Boardings per service hour | | Boardings per service hour | |

The summary table shows:

- consistent representation of measures of passenger demand, service quality and financial outcomes
- inconsistency in service provision information – fleet size and network accessibility are featured separately, and the NZTA reporting requirements do not stipulate coverage or access measures
- infrastructure quality, impacts and efficiency measures are represented by PTAs' dashboards, but are not represented in NZTA's requirements.

PTAs also measure performance of service delivery from a customer perspective by undertaking customer satisfaction surveys. As included in Table 3.2, NZTA requires that PTAs undertake a nationally consistent customer satisfaction survey at least once every 3 years.

Some PTAs supplement this survey with their own customer surveys that attempt to capture a broader range of users than existing customers and seek feedback on a broader range of experiences than the customer's last trip. For example, Auckland Transport administers its own weekly online survey, targeting patrons with a HOP card who have used public transport in the last week. This survey is not smoothed out on a 12-month rolling average, allowing Auckland Transport to understand seasonal variation. Additionally, as the online survey is not administered while a patron is on board, it may capture patrons who do not intend to further use the service.

Southland Regional Council engages both customers and ratepayers in annual opinion surveys. This is a unique approach in that ratepayer's perspective of value for money in the delivery of public transport is considered, whether they use public transport or not.

### 3.5.2    Assessment of current practice

Our interviews with PTAs revealed that they were generally comfortable with NZTA's current monthly reporting requirements. While some PTAs would like to further understand why certain data is requested, there was no feedback on major gaps in the suite of required measurements.

PTAs agree that there are several existing measures that should be better defined and standardised. Standardisation would allow regions to better compare service delivery, as well as aggregate data across regions. Particular measures that were identified as needing clearer definition include reliability, punctuality and farebox recovery (this feedback from PTAs was received prior to NZTA releasing a discussion paper on the concept of 'private share' which is intended to supersede farebox recovery).

PTAs reported that definitions for reliability and punctuality do not allow for detours or road closures or unique timings of school bus runs. Additionally, the existing NZTA definition of punctuality at first and last stop does not accurately reflect punctuality along the whole route, and in doing so is not a measure that accurately reflects the customer experience of the service.

PTAs were generally cautious about expanding reporting and measure collection requirements, as current practice is reasonably resource intensive, particularly for smaller PTAs. PTAs also noted that it can be an onerous task when NZTA changes the units and scale for which data must be retrieved and reported. This is especially true where effort has been made to automate these processes, and large quantities of raw data must be revisited to change outputs.

Similarly, PTAs report that the way certain measures are calculated internally and by NZTA can be different. This can require extra work from the PTA to translate, aggregate or transform their data in ways that may affect its integrity.

Additionally, conforming to certain units and levels of aggregation can reflect poorly on the PTA, and at first glance tell a negative story about a public transport network's performance.

While PTAs agree that consistent definitions are important, some PTAs questioned the relevance of certain measures and the granularity of data. There was a common desire to know why data was collected and how NZTA uses it. PTAs expressed desire for a balance between nationally consistent reporting and keeping measures relevant and useful locally.

Some measures were viewed as not relevant to local conditions. For example, in Taranaki, two-thirds of public transport customers are children boarding school buses. These services operate by prioritising moving on immediately after pickup, rather than adhering to schedule, as there will be subsequent buses on the

same route that pick up remaining children. In some situations, this arrangement may work well from a customer perspective but may show up as poor performance against the punctuality measure. This punctuality definition also does not work for larger PTAs with more high-frequency services. For frequent services (eg, with 5-minute peak headways), schedule adherence may not be relevant to customer experience of reliability and wait time.

The upcoming national ticketing system is viewed positively by PTAs as an opportunity for more efficient collection of data that informs key measures. Also known as Motu Move, the national ticketing system is a nationwide payment system for public transport networks that is currently being implemented.

Measures such as patronage and punctuality may be able to be derived from national ticketing system data. Because the data would be centralised (managed by NZTA), this could reduce the burden on PTAs to collect and process this data themselves. PTAs expressed interest in more automated and centralised collection of measures direct from this data source.

There was broad agreement across PTAs that above all else, measures should be focused on what matters to customer experience. Definitions of punctuality and reliability should be meaningful to the customer – for example, a customer may not be concerned with a schedule-adherence measure of punctuality on a high-frequency bus corridor. Cancellations were also mentioned as important measures reflecting customer experience. Cancellations are currently reported by the number of services cancelled, but the impact of service cancellations can vary depending on the service frequency, time of day and location (eg, the difference between the last long-distance train service being cancelled for a customer in an isolated location, against a single service on a high-frequency bus route being cancelled for a customer in the central city).

PTAs felt that the format of the existing customer satisfaction survey is limited in what it is able to say about service delivery itself. Because only existing customers are required to be surveyed, feedback is only being received by customers who are currently using the public transport service, which means that the service provided is likely to be sufficient for their needs compared to other modes. As a result, two user groups are being missed: former customers who have determined that the service no longer meets their needs, and potential customers.

## 3.6 Measures used for providing regional oversight of the transport system

### 3.6.1 Current practice

Alongside PTAs use of measures to monitor ongoing service delivery, PTAs also use measures to assess performance against strategic objectives. The measures described below are applied by PTAs with the intent of monitoring how public transport is serving policy objectives and are often reported less frequently than measures monitoring service delivery.

PTAs use a diverse range of measures for this purpose. This reflects a range of objectives, and a range of levels of resource put into performance measurement. Measures are embedded in a variety of strategic-level policy documents, including RPTPs, statements of intent, regional land transport plans and long-term plans.

In September 2024, NZTA released updated RPTP development guidelines, including guidance on measures. This guidance is outlined in the final column of Table 3.5 (NZ Transport Agency Waka Kotahi, 2024b). We reviewed all 14 regions' RPTPs to understand what measures are commonly included, to compare these to NZTA's guidelines, and identify where there may be gaps.

**Table 3.5**      Review of measures included in fourteen RPTPs, alongside NZTA guidelines

| Measure category | Included in ten or more RPTPs | Included in four or five RPTPs | Included in three RPTPs | NZTA development guidelines for RPTPs (NZ Transport Agency Waka Kotahi, 2024b) |
|---|---|---|---|---|
| Passenger demand | Boardings | | Passenger kms | Patronage |
| Service provision | | Network coverage | | |
| Service quality | Punctuality<br>Reliability<br>Customer satisfaction | Complaints<br>Safety and security incidents<br>Disability access<br>Bus condition | Perception of fares | Punctuality<br>Reliability<br>Complaints<br>Safety and security incidents |
| Infrastructure quality | | | | |
| Financial | Farebox recovery | | Non-patronage revenue | Fare revenue<br>Public and private revenue ratio |
| Impacts | | | Greenhouse gas emissions | Greenhouse gas emissions |
| Efficiency | | | Fare evasion | Cost per service km<br>Net cost per passenger |

Our analysis found that the most common measures PTAs specified were:

- total patronage
- reliability
- farebox recovery
- punctuality
- customer satisfaction.

These common measures are consistent with the delivery measures required by NZTA. Mode share and environmental measures (including greenhouse gas emissions) were among the least common measures.

While 47% of specified measures were common between two or more RPTPs, 53% of measures identified were unique to their RPTP. This may indicate differences in priorities or strategy between PTAs necessitating bespoke measures to monitor their network effectively, a lack of appropriate national guidance or reflect historical practices. Smaller regional council's RPTPs presented a modest suite of measures, generally focused on patronage, reliability and farebox recovery (eg, Nelson Tasman, Marlborough, West Coast).

The measures commonly featured in RPTPs are generally consistent with NZTA's RPTP guidelines (NZ Transport Agency Waka Kotahi, 2024b). The guidelines provide efficiency measures (cost per service kilometre and net cost per passenger), where there is currently a gap. However, there remains a lack of measures addressing infrastructure quality. PTAs report on performance measures annually as part of NZTA's transport investment online applications, which is an online funding application system for public

transport continuous programmes. Customer satisfaction surveys are administered every 1 to 3 years as a part of operator contracts. Other measures may be collected or reported on a monthly or quarterly basis.

### 3.6.2 Assessment of current practice

The above RPTP measures analysis is current as of August 2024. As with the system delivery measures, there is significant appetite from PTAs for further guidance and consistent definitions and tools for performance measures. Some of the guidance in the RPTP guidelines include suggestions or descriptions of how measures might be defined. However, most do not provide further detail than the themes described in Table 3.5. Considering the expressed desire from PTAs for more detailed guidance, this presents an opportunity for these guidelines to be expanded on and to potentially become more prescriptive.

PTAs reported that measures of mode share and access were most challenging to calculate due to gaps in data and methodology. Measures for access and network coverage are not commonly included in RPTPs and for those that do attempt to measure access there is variation in methodology making benchmarking difficult.

Current approaches to measuring system-level climate change outcomes include fleet electrification and greenhouse gas emission measures. Some PTAs expressed challenges in estimating emissions from public transport operations, including significant costs in calculating emissions. Additionally, it is among the least frequent measures featured in RPTPs. While emissions targets are mentioned by the new RPTP guidelines, the measure is not further defined. This presents an opportunity for NZTA to provide national-level guidance and tools for PTAs to be able to consistently measure their performance against climate change goals.

To enable PTAs to measure performance outcomes consistently, there is an appetite for national tools that can be used to monitor the public transport network for all councils. Some tools or analysis subscriptions are not accessible to some PTAs due to cost constraints. An example of this type of platform is LeapThought, which is subscribed to by Bay of Plenty, Waikato and Otago regional councils. This platform supports a real-time dashboard displaying data uploaded by service operators, which facilitates these PTAs' monthly reporting.

## 3.7 Measures used for providing national oversight of the transport system

### 3.7.1 Current practice

NZTA and the Ministry of Transport use a range of measures to understand and report on performance of the public transport system at a national level and how the system contributes to wider multi-modal transport system objectives.

The Ministry of Transport's transport outcomes framework (Te Manatū Waka Ministry of Transport, 2022) includes specification of a set of 37 indicators designed to monitor performance against the transport sector's five high-level outcomes. A public-facing dashboard reports on indicators. Table 3.6 lists a subset of 15 of the 37 indicators that are relevant to public transport. The indicators are segmented by mode (walking, cycling, road, rail, maritime, aviation). This segmentation does not currently allow for monitoring of the public transport system as a whole, as the system involves components of road, rail and maritime transport. Some indicators are specific to the public transport system (eg, perception of public transport and population with access to frequent public transport).

**Table 3.6    Transport indicators from the transport outcomes framework that are relevant to public transport (adapted from Te Manatū Waka Ministry of Transport, 2022)**

| Transport outcome | Indicator |
| --- | --- |
| Healthy and safe people | Transport-related deaths |
| | Transport-related serious injuries |
| | Transport sector work injuries |
| | Harmful emissions from fuel combustion |
| Economic prosperity | Travel time reliability within metropolitan and high-growth areas |
| Inclusive access | Population with access to frequent public transport services |
| | Access to jobs |
| | Access to the natural environment |
| | Perception of public transport |
| Resilience and security | Security incidents |
| | Perceived personal safety while using the transport system |
| Environmental sustainability | Greenhouse gases emitted from the New Zealand transport system |
| | Vehicle fleet composition |
| | Mode share of short trips |
| | Fuel efficiency |

NZTA collates data on several public transport performance measures through structured reporting requirements for PTAs. PTAs are required to submit data against various measures on a monthly, annual and tri-annual basis, depending on the measure (the same NZTA data requirements as discussed in previous sections). NZTA's *Procurement Manual for Activities Funded Through the National Land Transport Programme* includes one set of reporting requirements (NZ Transport Agency Waka Kotahi, 2022), while a separate set of monthly reporting requirements has recently been circulated to PTAs (NZ Transport Agency Waka Kotahi 2024e). These monthly reporting requirements are discussed in more detail in Section 3.5.1. A third set of reporting requirements is associated with the 'annual achievement returns' process for activities funded through the National Land Transport Programme.

NZTA collates this data and uses it internally for sector monitoring, but does not comprehensively publish the data publicly or distribute it back to PTAs to enable comparison between PTAs. A subset of collected data is reported as part of the funding and transport dashboard (NZ Transport Agency Waka Kotahi, 2025b). This includes the following public transport measures, disaggregated by region, year and mode:

- operating expenditure
- service kilometres
- boardings
- fare revenue
- passenger kilometres
- fleet size.

A snip of the NZTA online dashboard is illustrated in Figure 3.2.

**Figure 3.2    Screenshot of NZTA funding and transport dashboard (reprinted from NZ Transport Agency Waka Kotahi, 2025b)**
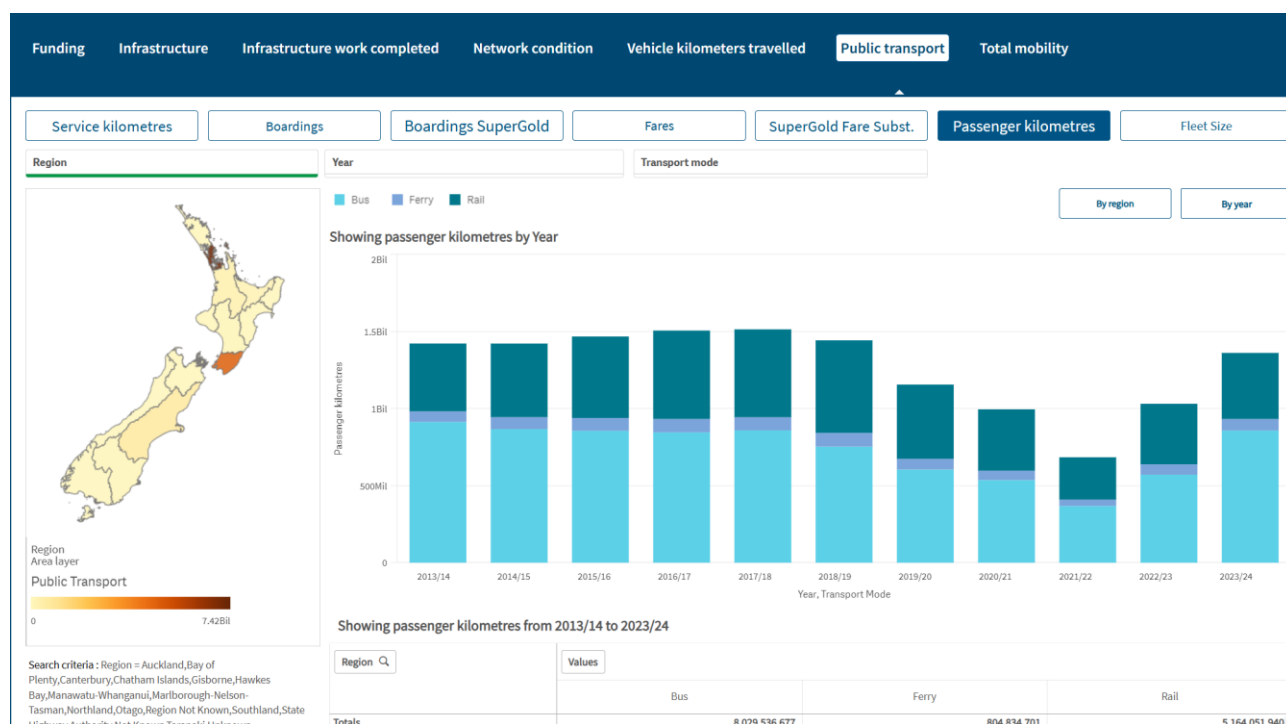


Some of the collated data is used to report against measures included in NZTA's annual statement of intent and statement of performance expectations. The statement of performance expectations is a requirement of the NZTA under the Crown Entities Act 2004, and sets out how the organisation will measure the financial and non-financial performance of the activities (output classes) it delivers and the outcomes it works toward. The 2024/25 statement of performance expectations include various types of measures and associated targets, as summarised in Table 3.7.

**Table 3.7    Measures related to public transport included in the NZTA statement of intent and statement of performance expectations 2024/25 (adapted from NZ Transport Agency Waka Kotahi, 2024f)**

| Category | Subcategory | Measure |
|---|---|---|
| Statement of intent: system outcome measures | Effectively and efficiently moving people and freight | MOVE2: User experience of transport network by mode (percentage of survey respondents who gave 8–10 out of 10 for their overall journey experience) – public transport |
| Statement of performance expectations: output class measures | Public transport services output class | PTS1: Number of boardings on public transport services |
| | | PTS2: Reliability of public transport services |
| | Public transport infrastructure output class | PTS1: Number of boardings on public transport services |
| | | PTI1: Punctuality of metro rail |
| Vote Transport appropriation measures | Public transport bus decarbonisation appropriation | ZEV1: Increase in the number of zero-emission vehicles deployed into the public transport fleet, measured annually |
| | | EUB1: Reduction in the number of Euro III and below buses deployed in the public transport fleet |
| | Retaining and recruiting bus drivers appropriation | RBD1: Proportion of scheduled bus service trips not operated |

| Category | Subcategory | Measure |
|---|---|---|
| | Community Connect programme appropriation | CCP1: Community Connect is implemented in at least one major urban area in the short term |
| | | CCP2: Number of boardings using Community Connect concessions |
| | | CCP4: Number of trips using Total Mobility concessions |
| | Mode shift – planning, infrastructure, services and activities appropriation | MSTP4: Number of new or upgraded bus stops |
| | | MSTP5: Kilometres of bus priority lanes |
| | SuperGold card enhanced public transport concessions scheme | SG2: Number of boardings using SuperGold concessions |

NZTA also measures public transport performance from a customer perceptions perspective as part of its multi-modal journey experience monitor. NZTA states that the monitor 'focuses on land transport journeys: who takes journeys and why, how journeys are taken and where they go, what these journey experiences are like and whether there are any barriers to journeys' (NZ Transport Agency Waka Kotahi, 2024a, p. 4).

The monitor involves a continuous online tracking survey about the travel behaviours of New Zealand adults and has been running since 2019. The survey questionnaire includes approximately 24 questions relevant to public transport performance and findings from the survey can be used to report on customer experience of public transport at a national level. The sample size means disaggregation of results to a regional or local level is difficult. Example questions from the survey questionnaire include:

- How affordable would you say this journey was for you?
- How would you rate this journey for value for money?
- How crowded would you say the public transport vehicle was?
- How easy or difficult was it to access information which could help you plan and manage this journey?

An example of survey reporting is included in Figure 3.3, highlighting how the monitor can be used to assess the relative performance of public transport against other modes.

Figure 3.3    Example of reporting from NZTA's journey experience monitor – rating of elements of journey experience by mode (reprinted from NZ Transport Agency Waka Kotahi, 2024a, p. 26)
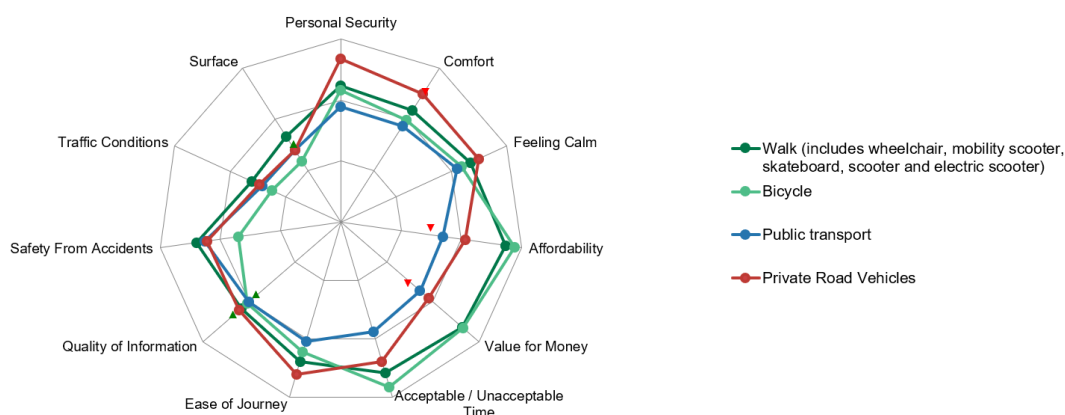


Finally, NZTA has established a set of measures relevant to public transport performance as part of the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2024f). The primary purpose of the framework is definition of a consistent set of benefit types and measures for informing investment decision-

making (eg, for options assessment in transport business cases). While this purpose is distinct from that of a framework for measuring ongoing operational performance of the public transport system (the focus of this research), there nevertheless is the opportunity for consistency in measures across these frameworks. The benefits framework is not designed for regular collection of data or reporting against measures, but rather provides a menu of measures that can be used to establish evidence to support investment decision-making on projects and programmes, with a focus on using measures to quantify how an investment will impact performance. Table 3.8 lists measures in the framework that are relevant to public transport.

Table 3.8    Key measures relevant to public transport performance included in NZTA's *Land Transport Benefits Framework* (adapted from NZ Transport Agency Waka Kotahi, 2024d)

| Transport outcome | Measure name | Notes on definition |
|---|---|---|
| Healthy and safe people | Crashes by severity | Number of crashes by severity |
| | Deaths and serious injuries | Number of deaths and serious injuries |
| Inclusive access | People – throughput of pedestrians, cyclists and public transport boardings | |
| | Ease of getting on/off services | Percentage of low floor and wheelchair accessible services |
| | Mode share | |
| | Accessibility – public transport facilities | Number of bus or train stops that are fully accessible |
| | Spatial coverage – public transport employees | Number of employees within 500m of a bus stop or 1km from a train or bus rapid transit station |
| | Spatial coverage – public transport resident population | Number of people resident within 500m of a bus stop or 1km from a train or bus rapid transit station |
| | Temporal availability – public transport | Public transport frequency per hour weighted by percentage of the population living within 500m of a bus stop or 1km from a train or bus rapid-transit station |
| Economic prosperity | Punctuality | Percentage of scheduled service trips between 59 seconds before and 4 minutes 59 seconds after the scheduled departure time of selected point |
| | Access to key economic destinations – public transport | Proportion of population living within travel time threshold (15 mins, 30 mins, 45 mins) of key economic opportunities (including work) by public transport in morning peak |
| Environmental sustainability | Greenhouse gas emissions | Total $CO_2e$ (carbon dioxide equivalent) emissions for fleet |

## 3.7.2    Assessment of current practice

Central government agencies (Ministry of Transport and NZTA) report on a range of measures to communicate and assess performance of public transport at an aggregate national level and to enable benchmarking of performance between regions. Measures are used for several distinct purposes, resulting in a mix of measures in use.

While there is some consistency in measures used for different purposes, there are also instances of similar aspects of performance being measured in similar but slightly different ways, or different terms being used for the same measure. For example, measures of spatial coverage of public transport services and levels of access provided by public transport vary between that reported through the Ministry of Transport's transport outcomes framework indicators (Te Manatū Waka Ministry of Transport, 2022) and those defined through NZTA's *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f). There is opportunity for clearer definition of a common set of measures that can be used for a range of central government purposes.

NZTA has several sets of reporting requirements for PTAs to provide performance data at various intervals. Reporting requirements have recently been updated by NZTA and there appears to be strengthening guidance on measure definitions and data needs. There is, however, possible overlap in current reporting requirements and through our interviews some PTA representatives expressed frustration at duplicative efforts in submitting data to NZTA (eg, monthly and annual reporting requirements using similar data) and lack of clarity about the purpose of providing some types of data and certain levels of disaggregation. There is wide variation in capacity across PTAs and some smaller PTAs suggested that current reporting requirements are onerous.

PTAs and NZTA itself identified several opportunities for improving data collection and measurement processes related to public transport data from PTAs. These include:

- automating and centralising some types of data collection and processing (eg, public transport boardings) through NZTA access to the new national ticketing system, Motu Move
- improved timeliness and quality of data provided by PTAs to NZTA
- increased use of national tools administered by NZTA for calculating some types of measures (eg, public transport service coverage, access and greenhouse gas emissions measures)
- increased use of journey experience monitor findings (eg, making data, and reporting public and disaggregating data, to a regional level to inform PTAs regional-level monitoring)
- increased publication of data collated by NZTA from PTAs to enable PTAs to use data for their own inter-regional benchmarking
- increased visibility of how NZTA uses the data it collects from PTAs to inform decisions and monitor the system to build confidence among PTAs about the need for submitting data.

PTAs were generally supportive of collation of consistent data from PTAs to enable benchmarking. However, several challenges were also identified. Some PTAs expressed the need for a balance between nationally consistent reporting and ensuring measures are locally relevant and useful. For example, some measures that may be applicable in larger cities with frequent public transport routes may not be applicable to other contexts where all public transport services are relatively infrequent. Some PTAs also raised concerns about consistency of data availability and collection methods across regions to enable accurate benchmarking or national-level aggregation of data. For example, not all PTAs have bus fleets that include global positioning system (GPS) tracking technology that enables collection of some types of reliability and travel time measures.

Regarding measures of customer perception that are sourced from customer surveys, some PTAs raised concerns about the practicality of measuring customer perceptions in a consistent way across regions that allows for national-level aggregation or benchmarking. For example, regions use different survey sampling methods.

## 3.8    Summary of current New Zealand practice

A wide range of measures are used for monitoring the performance of public transport for different purposes and at different spatial scales.

NZTA has recently strengthened its guidance to PTAs on measures that should be reported regularly to NZTA and that should be included as part of system-level monitoring of outcomes through RPTPs. This should lead to more consistency in measures.

Table 3.9 provides a summary of current levels of consistency and the extent to which measures are reported on for various monitoring purposes and among PTAs. Several measures are well-established and reported on commonly and consistently, for example, passenger demand and passenger kilometres, service kilometres and fare revenue. Another set of measures are commonly reported on, but with more variation in definitions and level of detail provided, for example measures of reliability, punctuality and financial measures.

There are various gaps in measure reporting, with some key performance measures only reported by some PTAs and some areas of measurement where there are very different approaches to calculating similar factors. For example, measures of network coverage (eg, population within a certain distance threshold of public transport services) and levels of access provided by public transport (eg, proportion of jobs accessible within certain travel time thresholds) are calculated by only some PTAs and use a range of definitions. Some aspects of service quality are infrequently measured, for example on-board comfort factors such as crowding. Infrastructure factors are also infrequently measured (eg, measures of public transport facilities or running way quality and provision).

**Table 3.9     Level of consistency in the use of key measures across different levels of oversight and among PTAs**

| Measure category | Measurement purpose | | | |
|---|---|---|---|---|
| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
| Passenger demand | N/A | High consistency: passenger boardings, kilometres | | |
| | N/A | | Low consistency: public transport mode share | |
| Service provision | High consistency: scheduled and operated trips, service kilometres, fleet inventory | | | |
| | Low consistency: workforce measures | | | |
| | N/A | | Low consistency or gaps: network coverage and access | |
| Service quality | High consistency: cancellations, incident, complaints, customer satisfaction | | | |
| | Moderate consistency: punctuality, reliability | | | |
| | Low consistency or gaps: comfort, information provision, service frequency and travel time | | | |
| Infrastructure quality | N/A | Low consistency or gaps: facilities and running way quality | | |
| Financial | High consistency: fare revenue | | | |
| | Moderate consistency: expenditure, other revenue sources, private revenue share or farebox recovery | | | |

| Measure category | Measurement purpose | | | |
|---|---|---|---|---|
| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
| Impacts | N/A | | Low consistency or gaps: greenhouse gas emissions, wider social and economic impacts | |
| Efficiency | Low consistency: productivity, cost efficiency, utilisation measures | | | |

# 4     Organising framework for measures

This chapter reports on the process of developing an organising framework for public transport performance measures relevant to New Zealand, building on the review of existing literature and practice. It summarises how we identified and tested various organising approaches for measures and arrived at a recommended framework.

## 4.1     Principles for an organising framework

The scope of this research includes both identifying a measures framework (ie, a logical approach to organising measures) and a suite of measures to populate the framework. The suite of measures is potentially extensive, and the purpose of an organising framework is to communicate relationships between measures, provide an overarching structure within which measures are placed and show links to broader policy frameworks. This will help users understand how individual measures fit within a broader context. The framework sets up a structure within which new measures can be added in future as new data becomes available and the context changes.

As noted in Chapter 1, the brief for this research includes establishing an organising framework for measures that is vertically integrated and consistent with the New Zealand *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f). A vertically integrated organising framework will communicate links between measures across various levels and various geographic scales of oversight, for example by moving toward more consistency in measures used to monitor operator performance at a contract-unit scale, individual service performance at a route scale, and regional and national system performance at a broader scale.

A framework that is consistent with the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f) will communicate linkages between measures and the five transport outcomes that the benefits framework is built on and the specific measures already established by this framework (see discussion of public transport-related measures in the benefits framework in Section 3.7.1). The five outcomes that are the top level of the benefits framework are:

- healthy and safe people
- resilience and security
- economic prosperity
- environmental sustainability
- inclusive access (NZ Transport Agency Waka Kotahi, 2025f).

We also consider that an effective organising framework for measures should be easily understandable by a broad audience and communicate the relative importance of measures for different purposes.

## 4.2     Categorising measures

Our review of international literature and practice found that most public transport performance measurement frameworks involved categorising measures into themes. Categorisation assists with simplifying communication about and understandability of frameworks with large numbers of measures, and helps communicate the relationships between measures. We considered various approaches to categorisation, including:

- nested hierarchies of categories and subcategories

- non-hierarchical categorisation (ie, tagging measures against multiple categories but not attempting to place measures within a single 'box' within a hierarchical structure).

While non-hierarchical organising frameworks are useful in communicating the range of relationships that a single measure may have to multiple factors, we concluded that a nested hierarchy is more straightforward and also clearly communicates the place of each set of measures within an overall structure.

The literature and practice review found multiple ways of categorising measures and our categories evolved over the course of the research. We initially attempted to categorise measures to align with the five transport outcomes, consistent with the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f). However, we found that many of the common measures used in international and local practice would not fit easily into the outcome categories. Many measures are relevant to more than one of the five categories, reflecting that good performance of a public transport system contributes to multiple high-level outcomes. For example, measures of public transport demand, such as boardings and mode share, could potentially be relevant to all five outcomes given that higher public transport mode share can be associated with health, safety, environmental, economic and inclusive access benefits.

We tested various measure categories identified in the international literature. Table 2.1 in Section 2.3.2 summarises some of the main organising categories from the literature. From this we developed the set of categories in Table 4.1.

**Table 4.1     Version 1 of measure categories**

| Measure category | Informs understanding of |
| --- | --- |
| Passenger demand | How well used is public transport? |
| Service provision | How extensive and available are public transport services? |
| Service quality | What is the customer experience of public transport services? |
| Infrastructure quality | What is the customer experience of public transport infrastructure? How effectively does infrastructure support operations? |
| Financial | How much does public transport cost to operate? |
| Impacts | What are the broader impacts of public transport operations? |
| Efficiency | How efficient is public transport in providing outputs and outcomes? |
| Distribution | How are public transport system outputs and benefits distributed between social groups (age, gender, etc)? |

We considered that this initial set of categories would benefit from a higher-level organising logic to justify the categories and communicate their relationships. We tested two additional approaches:

- inclusion of the concepts of 'input', 'output' and 'outcome' measures
- inclusion of key user perspectives or 'lenses' through which measures are viewed – including customer, provider and funder.

The concept of inputs, outputs and outcomes is well-established in performance measurement frameworks and is discussed, for example, in the Commonwealth of Australia's (2021) *Australian Transport Assessment and Planning Guidelines: M1 Public Transport*, which notes that measures can describe a range of activities, including:

- process: measures the type of process policy or activity
- inputs: measure the resource invested or used by an activity
- outputs: measure the level and extent of activity
- outcomes: measure the end result.

Adopting the input/output/outcome concept, we revised our initial set of categories to that outlined in Table 4.2. This involved several changes to our initial categorisation. We created multiple financial subcategories and placed the financial measures outside the input, output, outcome categories, as the category included measures of both financial inputs (ie, expenditure) but also financial performance (eg, efficiency of expenditure in providing outputs). We changed the label of the 'service provision' category to 'network' to reflect the focus on measures of both network structure and the extent of service provided on the networks. We created a new category of 'fleet and workforce' as this is a key input to service delivery. We created a new category of 'access' as a key output that public transport systems provide and re-labelled the previous 'impact' category as 'transport system outcomes'. We also removed the efficiency and distribution categories, considering these measures could be absorbed into other categories.

**Table 4.2     Version 2 of measure categories**

|  | Measure category |
|---|---|
| Financial | 1. Revenue |
|  | 2. Expenditure |
|  | 3. Financial performance |
| Inputs | 4. Network |
|  | 5. Fleet and workforce |
|  | 6. Infrastructure |
| Outputs | 7. Service quality |
|  | 8. Service use |
|  | 9. Access |
| Outcomes | 10. Transport system outcomes |

A key theme from the international literature is that different measures of public transport performance involve viewing the system from different perspectives, and that measures will be more or less important depending on the perspective. Key perspectives include that of the customer who uses the system, the operator that provides the system and the system funder. We experimented with approaches to including these perspectives within our measure categories, and particularly with highlighting measures that are important from a customer perspective.

This informed development of our final recommended categories for organising measures as set out in Table 4.3. This categorisation included several changes from version 2 above, including:

- the 'financial' category is included as an 'input', with efficiency measures that were previously a subset of measures within the financial category shifted to a new category
- the 'service quality' category is re-labelled 'customer experience' to reinforce that this is the main category of measures providing indicators from the customer perspective
- the 'access' category is removed and measures within it shifted to the 'system outcomes' category
- the 'outputs' label is changed to 'delivery' to reflect inclusion of the efficiency category, which is not just about outputs but the efficiency by which inputs are delivering outputs.

**Table 4.3    Final recommended measure categories**

|  | Category | Subcategories | Informs understanding of… |
|---|---|---|---|
| Inputs | 1. Financial | Revenue; expenditure; private share | How much does public transport cost for investors? Where does revenue come from? |
|  | 2. Network | Network structure; service provision | How extensive and available are public transport services? |
|  | 3. Fleet and workforce | Fleet; workforce | What is the size and quality of the public transport fleet? What is the availability of the workforce to operate public transport? |
|  | 4. Infrastructure | Public transport facilities; running way | What is the quality of public transport infrastructure? |
| Delivery | 5. Customer experience | Service frequency; travel time; reliability; on-vehicle comfort; facilities comfort; customer information, safety and security; cost to customer; overall customer experience; wider community perceptions | What is the quality of the public transport service experience for customers? |
|  | 6. Service use | Passenger demand; end-to-end journey; mode share | How is public transport used? |
|  | 7. Efficiency | Service utilisation; cost efficiency | How efficiently are public transport services provided? |
| Outcomes | 8. Transport system outcomes | Healthy and safe people; resilience and security; economic prosperity; environmental sustainability; inclusive access | How well does public transport contribute to transport system outcomes? |

In applying the inputs/delivery/outcomes framework across the measure categories we were aware of challenges in positioning categories within this framework. For example, we were aware that the 'fleet and workforce' and 'infrastructure' categories relate not only to 'inputs' but also to 'delivery' of the public transport system. We managed this by limiting measures of fleet, workforce and infrastructure within the inputs part of the framework to measures of the resources enabling service delivery and operation (eg, workforce, physical assets such as fleet vehicles and supporting infrastructure). Measures of the operational performance of fleet, workforce and infrastructure are included as subcategories within the 'customer experience' category. For example, there are categories of 'on-vehicle comfort' (related to fleet), 'facilities comfort' (related to infrastructure) and 'customer information' (related to both fleet and infrastructure).

## 4.3    Vertical integration

The concept of vertical integration of measures is core to the research objectives and the organising framework needs to communicate this concept. We considered three primary 'vertical levels' that could be highlighted by the framework to show how measures could be consistent or 'flow through' between levels:

- geographic scales at which measures are applied
- key organisations that use measures
- key purposes for which measures are used

Using geographic scales as a key organising device in the framework could highlight links in measures across the following spatially nested scales:

- public transport route
- public transport operating contract unit
- sub-region (eg, West Auckland within the overall Auckland region)
- local council area within a region
- region (eg, Auckland region)
- national.

An alternative set of geographic scales could highlight links in measures across the various urban and rural spatial contexts, as defined by NZTA's public transport framework (eg, major, large, medium, small urban areas, rural settlements and hinterland) (NZ Transport Agency Waka Kotahi, 2025e).

Another organising device could highlight integration of measures across key organisations that undertake public transport performance measurement, for example:

- public transport operators
- PTAs
- RCAs and other infrastructure providers
- NZTA
- Ministry of Transport.

Finally, a framework organised by key purposes for which measurement is undertaken highlights potential integration between the different functions for which measures are used. This refers back to our review of current New Zealand practice (Section 3.3.), which identified four key purposes for which measures are used in New Zealand (monitoring public transport operators, planning and managing public transport system delivery, providing regional oversight of the transport system and providing national oversight of the transport system).

There are relationships between these four key purposes for measurement and both the geographic scales at which measures are applied and the key organisations involved. Table 4.4 summarises the connections between the four purposes and geographic scales. Monitoring operators occurs primarily at the scale of the contract unit (a collection of routes) and on individual routes. Measurement for planning and management of ongoing system delivery occurs at all scales within the region, while measurement of public transport for the purpose of providing regional oversight of the transport system is generally most relevant at a regional or sub-regional scale rather than route or contract-unit scale. NZTA's national oversight generally focuses on either measuring performance at an aggregate national level or oversight of regional-scale performance.

**Table 4.4    Relationship between purposes of measurement and geographic scales for which public transport performance measures are used**

| Geographic scale of measurement | Purpose for which measures are used | | | |
| --- | --- | --- | --- | --- |
| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
| Route | Relevant | Relevant | Not relevant | Not relevant |
| Operating contract unit | | | | |
| Sub-region | Not relevant | | Relevant | |
| Region | | | | Relevant |
| National | | Not relevant | Not relevant | |

Table 4.5 summarises the relationships between the key organisations involved in undertaking measurement of public transport performance and the purposes for which measures are used. Both operators and PTAs are involved in purpose A: monitoring operators. Several organisations are involved in purpose B: planning and managing system delivery, including PTAs, RCAs and other providers of supporting public transport infrastructure (including NZTA in its role as an RCA on some state highway corridors used by public transport). PTAs are responsible for regional oversight of the transport system (purpose C), while NZTA and Ministry of Transport are responsible for national oversight (purpose D).

**Table 4.5    Relationship between purposes of measurement and key organisations undertaking measurement**

| Key organisation measuring | Purpose for which measures are used | | | |
| --- | --- | --- | --- | --- |
| | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
| Operator | Involved | Not involved | Not involved | Not involved |
| PTA | | Involved | Involved | |
| RCAs and other infrastructure providers | Not involved | | Not involved | |
| NZTA | | | | Involved |
| Ministry of Transport | | Not involved | | |

Our proposed framework uses the four key purposes as the organising device for communicating how measures across different vertical levels can be integrated. While we considered using geographic scales and key organisations as organising devices, we concluded that the four purposes were more relevant to users of the framework and could allow easy relationship of measures to common measurement processes established in current New Zealand practice. This is not to say that measures cannot be integrated across different geographic scales and different organisations, but simply that we recommend use of the four key purposes as the primary organising device for the measures framework.

We consider it important to distinguish among the range of functions held by PTAs. Using the four key purposes highlights the range of distinct functions undertaken by PTAs that are at the centre of public transport planning and management; from managing contracts to monitoring system delivery and undertaking strategic long-term planning.

We considered various options for the specification of the four key purposes. For example, we considered whether purpose A: monitoring public transport operators and purpose B: planning and managing should be combined (ie, whether monitoring operators and monitoring system delivery require distinction). We concluded that distinction of these two purposes is useful as measures used for monitoring operators' contractual obligations are more limited than those used for monitoring system delivery. Monitoring system delivery includes a wider range of considerations, including supporting infrastructure and achievement of policy objectives, not just operators' adherence to contractual obligations.

We also considered whether purposes B and C could be combined. While both purposes involve monitoring public transport systems at a regional scale, we concluded that distinguishing these two purposes is useful and there are differences in measures, reporting mechanisms and frequency of measurement across these two functions. For example, purpose C: providing regional oversight of the transport system, involves measuring elements of network structure and access provided by the public transport system that are only usefully considered on a periodic basis (ie, not more often than annually), whereas measurement for managing and planning system delivery involves measures that may be monitored as frequently as daily (or even in real time if technology allows).

We also considered whether purposes C and D could be combined, as both involve system-level oversight. We concluded that highlighting the distinct national-level oversight function undertaken by NZTA and other government agencies is important for the framework.

## 4.4    Measure dimensions

Alongside the measure categories and the four levels of oversight, a third element of our framework involves definition of common 'dimensions' by which measures can be disaggregated for monitoring and reporting. Reporting on many common measures is often disaggregated, with dimensions of disaggregation common across different measures; for example, measures of passenger boardings, fleet inventory, efficiency, reliability and other factors are often reported by mode. Measures of passenger boardings and customer satisfaction are often disaggregated by customer segments or social groups; for example, by age or gender.

As part of our framework we define a set of common dimensions to support consistent monitoring and reporting across different measures, across different organisations and for different measurement purposes (Table 4.6). Our list of recommended measures introduced in Chapter 5 and detailed in Appendix C, defines dimensions by which measures should be reported. There will be a range of other dimensions, specific to individual measures that may also be used.

Most of the dimensions and recommended disaggregation listed in Table 4.6 are straightforward and follow common existing New Zealand practice. The service-type dimension is consistent with the 'functional service descriptors' classification of services recently introduced by NZTA and communicated through its development guidelines for RPTPs (NZ Transport Agency Waka Kotahi, 2024b), which are shown in Figure 4.1. The guidelines specify minimum levels of service frequency and span for each service type. Consistent use of a common classification system for public transport services will be useful for public transport performance monitoring and reporting. It allows, for example, benchmarking between regions on the extent of service provision of different service types and for analysis of factors such as passenger demand and efficiency across different service types.

**Figure 4.1  Functional service descriptors (reprinted from NZ Transport Agency Waka Kotahi, 2024b, p. 21)**
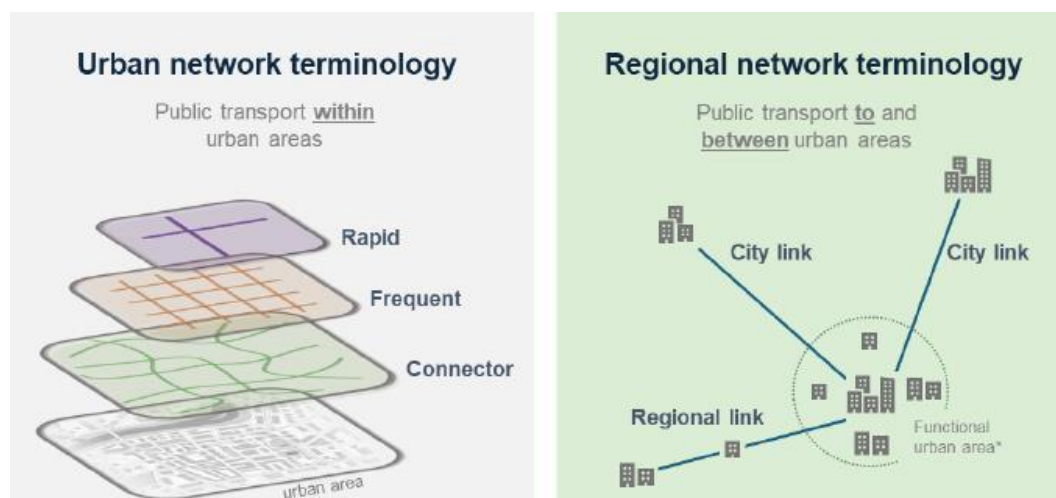


Disaggregating reporting of measures by customer segmentation can assist with understanding the distribution or level of equity among social groups in how public transport services and outputs are provided. For example, disaggregation of customer satisfaction by age and gender can reveal inequities or unmet needs among certain age groups or genders. Disaggregating service provision among different areas of socio-economic deprivation can increase understanding of the relative level of service provided to different social groups.

**Table 4.6  Common dimensions for reporting measures**

| Dimension | Disaggregation |
|---|---|
| Mode | Bus<br>Train<br>Ferry |
| Network component | Region (default)<br>Sub-region<br>Unit<br>Route |
| Service type | Urban rapid<br>Urban frequent<br>Urban connector<br>Urban targeted<br>Regional city link<br>Regional link<br>Regional targeted<br>(as per NZ Transport Agency Waka Kotahi, 2024b) |
| Spatial context | Major urban area<br>Large urban area<br>Medium urban area<br>Small urban area<br>Rural settlements<br>Hinterland<br>(as per NZ Transport Agency Waka Kotahi 2025e) |

| Dimension | Disaggregation |
|---|---|
| Time period | Hour<br>Peak/ off-peak<br>Day<br>Week<br>Month<br>Quarter |
| Customer segmentation | Age<br>Gender<br>Disability<br>Socio-economic deprivation<br>Fare concession type |

## 4.5 Summary of recommended organising framework

Table 4.7 summarises the overall recommended organising framework. The framework places measures within relevant 'boxes' of a matrix defined by two key dimensions; measure categories and purposes of measurement. Some measures will be vertically integrated in that they will be common across multiple purposes. Other measures will be specific to one or a few key purposes. Our framework also suggests the definition of two tiers of measures: 'headline' or core measures, and supplementary measures of lesser importance.

**Table 4.7      Summary framework**

| | | | Purposes of measurement | | | |
|---|---|---|---|---|---|---|
| | | | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Regional oversight of transport system | D. National oversight of transport system |
| Categories | Inputs | 1. Financial | | | | |
| | | 2. Network | | | | |
| | | 3. Fleet and workforce | | | | |
| | | 4. Infrastructure | | | | |
| | Delivery | 5. Customer experience | | | | |
| | | 6. Service use | | | | |
| | | 7. Efficiency | | | | |
| | Outcomes | 8. Transport system outcomes | | | | |
| Headline and supplementary measures identified for each relevant box in framework | | | | | | |
| Common dimensions for disaggregating measures | | | | | | |

# 5    Selecting measures

This chapter builds on the recommended organising framework for public transport performance measures identified in the previous chapter, and reports on the process used to select a suite of specific recommended measures to populate each of the eight measure categories established by the framework. Our process for selecting measures involved first considering relevant measures for the eight categories (the subject of this chapter) and then considering how each measure could be applied to each of the four key purposes for public transport performance measurement (the subject of Chapter 6).

This chapter first summarises our approach to selecting measures and then reports on recommended measures for each of the eight categories and 30 subcategories within the organising framework. The full set of recommended measures (79 in total) is detailed in Appendix C. Each of the measures is labelled with a measure identifier to enable cross-referencing throughout the report and with Appendix C.

While we have recommended a specific suite of measures, the overall framework is designed to be flexible to accommodate new and revised measures to reflect changing context, new data availability and changing policy priorities.

## 5.1    Approach to selecting measures

Our approach to identifying measures for the framework involved starting with our categories and identifying a full range of potential measures relevant to each category based on those referenced in the following sources:

- international literature (as summarised in Section 2.3)
- case studies of international practice (as summarised in Section 2.4)
- New Zealand practice by PTAs, NZTA and other relevant government agencies (as summarised in Section 3).

We assessed all potential measures against several criteria to evaluate the value, applicability and feasibility of including each within our framework. The criteria are outlined in Table 5.1 and they draw on the Commonwealth of Australia's (2021) *Australian Transport Assessment and Planning Guidelines: M1 Public Transport*, which highlight desirable characteristics of key performance indicators (see Section 2.3.3).

**Table 5.1    Criteria for assessing potential measures for inclusion in framework**

| Principle of effective measures | Considerations |
|---|---|
| Understandable | Is the measure intuitively understandable?<br>Is the measure simply explained to a broad audience? |
| Accurate | Does reporting the measure require extensive manipulation of raw data?<br>Are tools available to easily analyse the data to produce the measure?<br>Does the measure accurately reflect real activity? |
| Feasible | Is the measure in current use in New Zealand or internationally?<br>Is data available to produce the measure?<br>How much analytic effort is required to transform raw data into reporting on the measure? |
| Connected to outcomes | Does the measure indicate something that is important for customer experience or agency or other stakeholder concerns?<br>Does the measure provide information that can be used to help make decisions or inform changes to current practice? |

| Principle of effective measures | Considerations |
|---|---|
| Relevant to context | Is the measure applicable to multiple levels of sector oversight? |
| | Is the measure applicable to contexts within which PTAs operate public transport in New Zealand? |

We selected measures based on the outcomes of our assessment and consideration of how the measures fit together across categories. We aimed to select a full suite of measures that was comprehensive and provided information about all factors that contribute to public transport performance. At the same time, we attempted to keep the framework streamlined by only including measures that provide valuable information for making decisions for improving performance. We prioritised measures that could be consistently used across multiple levels of reporting and oversight (eg, those that are relevant for both oversight of operating contract units and could also be used for system-level oversight). We considered integration of measures between categories and selected measures that minimised data gathering effort by using the same data sources for multiple measures. We generally retained measures that are well established in existing New Zealand practice and are supported by the literature and international practice.

Some of the measures identified can be usefully standardised against population or other factors, particularly when used for purposes such as inter-regional comparison. For example, measures of patronage can be standardised by regional population (eg, boardings per capita), while measures of complaints or safety incidents can be standardised by passenger kilometres travelled (eg, number of complaints per million passenger kilometres). Our general approach has been to define measures by absolute values, but we note the value of standardising and envisage this being used in practice for relevant measures.

## 5.2 Financial measures

### 5.2.1 Literature and practice

Financial measures provide information about levels of financial resources applied to operations and capital investment. This category focuses on providing baseline financial information that can be used as inputs to calculate cost-efficiency measures, such as operating cost per boarding or measures of the proportion of expenditure from various revenue sources (eg, measures of 'private share' or 'farebox recovery'). Financial measures are essential for deriving some of the cost-efficiency measures that we include in the 'efficiency' category of our framework (Section 5.8).

Financial measures are typically dollar values organised by sources of revenue and categorisation of expenditure. The way in which financial information is organised and reported has close links to the financial reporting requirements and accounting standards applying to various agencies. It is beyond the scope of this project to inform detailed financial reporting arrangements relevant to public transport; nevertheless, financial measures are critical inputs to other measures and so are included in our framework.

Financial performance of public transport systems is distinct from performance from a customer perspective. Our review of international literature on public transport performance measurement frameworks found much of the literature more focused on performance from the customer perspective. Our review of selected international agency's headline reporting on public transport performance found that some agencies included financial measures, however, financial reporting is often distinct from public-facing performance reporting and less visible. TransLink Metro Vancouver's accountability centre includes various cost-efficiency measures that depend on baseline financial information, for example measures of average operating cost per boarding. It also includes a measure of 'operational cost recovery', being the percentage of operating cost covered by fare revenue (TransLink, 2025).

The US Department of Transportation Federal Transit Administration's (2023) reporting on its national transit database collates a comprehensive range of financial information from local transit agencies throughout the USA. These include reporting on sources of revenue, types of capital and operating expenditure, and farebox recovery.

Within New Zealand, there is a focus on measuring fare revenue and the proportion of operational expenditure on public transport services covered by fare revenue; often termed 'farebox recovery'. This has been in place for many years and PTAs are very familiar with the reporting requirement. Farebox recovery measures are the most commonly used financial measures included in PTAs' regular performance reporting (eg, included in Auckland Transport, Metlink and Bay of Plenty Regional Council's regular reporting, see Table 3.4) and as monitoring measures in PTAs' RPTPs. A recent NZTA discussion document re-defines previous measures of farebox recovery toward new measures of 'private share' of public transport operating expenditure, and aims at more consistent accounting of various sources of revenue and types of expenditure by PTAs across the country (NZ Transport Agency Waka Kotahi, 2024c). It proposes to introduce requirements for PTAs for regular reporting of revenue and expenditure across a consistent set of categories and includes an example statement of revenue and expenditure (categories summarised in Table 5.2).

Table 5.2    Categories of operating revenue and expenditure for potential consistent use across PTAs (adapted from NZ Transport Agency Waka Kotahi, 2024c, p. 50)

|  | Category |
|---|---|
| Revenue | Fees and charges |
|  | Third-party revenue |
|  | Grants and subsidies |
|  | General and targeted rates |
|  | Other income |
| Expenditure | Passenger services |
|  | Operations and maintenance |

## 5.2.2    Recommended financial measures

We recommend that financial input-type measures included in the framework align with the emerging requirements that will be defined by NZTA as part of the work programme involving the recent discussion document on increasing private share (NZ Transport Agency Waka Kotahi, 2024c). This suggests several measures of revenue by consistently defined sources, and operational expenditure by consistently defined categories. In addition, a measure of capital expenditure and a measure of the proportion of operating expenditure from private sources should be collated.

We recommend these financial measures are consistently disaggregated by the following dimensions: mode, network component and service type.

Consistent financial measures and consistent disaggregation by dimensions across PTAs can allow for reporting and monitoring both within PTAs and by NZTA to allow for benchmarking between PTAs and an aggregate view of nationwide financial performance. Collations of these measures are key inputs for efficiency measures (eg, a consistent definition of operating expenditure is required for efficiency measures such as average operating cost per passenger kilometre).

We note that accounting of capital expenditure for public transport is challenging and there are issues of consistent accounting of capital expenditure across public transport modes. As a starting point, we envisage a measure of capital expenditure to reflect annual investment in improvements consistent with NZTA's

National Land Transport Plan investment processes. There is, however, a broader opportunity for further investigation on how to account for public transport capital expenditure.

The full list of all measures described can be found in Appendix C.

# 5.3 Network measures

The network category of measures provides information about the structure of the public transport network and levels of service provision. Like other categories of input measures, network measures are generally not used as headline indicators of performance (ie, for the effectiveness or efficiency of the system). Rather, they provide important baseline information that is required to calculate other measures (eg, reliability, efficiency measures). We make a distinction between two subcategories of network measures.

- Network structure: measures that help describe key components of the public transport system at a regional or national level.
- Service provision: measures that provide information about the quantity and type of public transport service operated on the network.

## 5.3.1 Network structure

### 5.3.1.1 Literature and practice

Availability of public transport services is considered an important element to measure in some of the key literature on holistic public transport performance measurement frameworks (Kittleson & Associates et al., 2003; European Committee for Standardization, 2002). Within this category, example measures include operating hours, frequency and service coverage.

The US Department of Transportation Federal Transit Administration's (2023) national transit database provides an example of baseline information collated at a national level about the public transport system. Annual reporting on the database includes an 'inventory of operators and service provision' with measures of the number of public transport systems in operation by mode (eg, train, bus, demand response) and trends over recent years in how the number of systems has changed.

In New Zealand, NZTA's reporting requirements for PTAs do not currently require any reporting on elements of network structure, such as route km in the network by service type (but do require measures of service provision as described in the next section). We found no examples of PTAs including network structure measures as part of public-facing performance measure reporting. However, this information is no doubt available internally to PTAs.

### 5.3.1.2 Recommended network structure measures

We recommend that the following network structure measures are consistently collated by New Zealand PTAs to enable tracking over time and benchmarking between regions of the scale and structure of public transport networks:

- 2.1.1 Number of routes in network
- 2.1.2 Route km in network.

Measure 2.1.2 measures the total distance of routes in the network (both directions). It is distinct from a measure of service kilometres operated on these routes (see measure 2.2.2). These measures should be broken down by the following dimensions to provide useful information:

- mode

- network component (region, sub-region, contract unit)
- service type (eg, urban rapid, urban frequent etc categories consistent with RPTP guidelines (NZ Transport Agency Waka Kotahi, 2024)).

This disaggregation will allow for tracking changes over time in elements such as the extensiveness of the urban rapid public transport network.

These measures can be standardised by population or spatial area and certain dimensions can be focused on to enable benchmarking between regions or sub-regions (eg, a measure of 'route kilometres of urban frequent service per 100,000 population' could be used for benchmarking purposes).

Other measures considered for this category included service coverage indicators (eg, land area, population or jobs within distance thresholds (eg, 400m) or different types of public transport service). While these measures provide good descriptors of network structure, they were selected for inclusion as outcome rather than input measures as availability (ie, coverage) of services is a key outcome from public transport operations, providing potential users with the choice of public transport as a travel option.

## 5.3.2   Service provision

### 5.3.2.1   Literature and practice

Our review of case studies of international practice found that some agencies use service provision indicators as headline measures. For example, TransLink Metro Vancouver reports on annual transit service hours per capita and tracks trends over time as part of its public-facing accountability centre (TransLink, 2025). US Department of Transportation Federal Transit Administration (2025) includes various measures of 'service supplied' including vehicle revenue miles and system capacity by mode. System capacity is calculated by using vehicle revenue miles and multiplying by a 'capacity-equivalent factor' (average seating and standing capacity of vehicles by mode) to calculate 'capacity-equivalent vehicle revenue miles'. An example of how this measure is reported is provided in Figure 5.1.

**Figure 5.1    Example of reporting on a system capacity measure – capacity equivalent vehicle revenue miles (reprinted from US Department of Transportation Federal Transit Administration, 2023, p. 96)**

| Capacity-Equivalent VRM (Millions) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mode | 2013 | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 2022 | 2023 | Average Annual Rate of Change 2013 to 2023 |
| **Rail** | **3,500** | **3,620** | **3,787** | **3,829** | **3,939** | **3,856** | **3,921** | **3,441** | **3,254** | **3,431** | **3,558** | **0.7%** |
| Heavy Rail | 1,843 | 1,874 | 1,903 | 1,921 | 1,972 | 2,022 | 2,062 | 1,866 | 1,761 | 1,774 | 1,838 | 0.4% |
| Commuter Rail | 1,260 | 1,320 | 1,439 | 1,441 | 1,475 | 1,344 | 1,360 | 1,138 | 1,085 | 1,219 | 1,287 | 1.1% |
| Light Rail | 365 | 392 | 409 | 430 | 454 | 458 | 459 | 401 | 377 | 403 | 398 | 1.9% |
| Hybrid Rail | 11 | 12 | 12 | 12 | 12 | 12 | 19 | 18 | 17 | 19 | 17 | 7.6% |
| Streetcar Rail | 10 | 11 | 11 | 13 | 14 | 14 | 14 | 13 | 10 | 11 | 12 | 2.2% |
| Other Rail | 12 | 12 | 13 | 12 | 12 | 7 | 7 | 5 | 4 | 5 | 6 | 0.0% |
| **Non-Rail** | **2,256** | **2,306** | **2,336** | **2,385** | **2,409** | **2,426** | **2,456** | **2,176** | **2,064** | **2,155** | **2,196** | **0.0%** |
| Bus | 1,782 | 1,805 | 1,828 | 1,864 | 1,881 | 1,902 | 1,925 | 1,772 | 1,719 | 1,753 | 1,771 | -0.3% |
| Bus Rapid Transit | 10 | 13 | 15 | 18 | 17 | 17 | 19 | 19 | 20 | 20 | 21 | 18.0% |
| Commuter Bus | 144 | 152 | 150 | 155 | 158 | 156 | 158 | 105 | 82 | 98 | 101 | 8.7% |
| Trolleybus | 20 | 20 | 17 | 18 | 18 | 18 | 16 | 13 | 13 | 13 | 12 | -3.9% |

In New Zealand, NZTA requires PTAs to report four measures on a monthly basis: trips and service hours, with each disaggregated by 'scheduled' and 'operated'. These are used as inputs to measures of reliability. Our review of RPTPs found these measures are infrequently used for public-facing system monitoring, although are no doubt used for internal monitoring. Only the Northland RPTP included in-service hours and in-service kilometres as key performance indicators.

### 5.3.2.2    Recommended service provision measures

Our review suggests service provision can be reported in four distinct ways, and we recommend the following measures:

- 2.2.1 Scheduled capacity kilometres
- 2.2.2 Number of scheduled service kilometres
- 2.2.3 Number of scheduled service trips
- 2.2.4 Number of scheduled service hours.

This baseline information provides important inputs to enable the calculation of various measures of efficiency and some measures of reliability. Like most of the input-type measures, these measures provide limited information about public transport system performance in isolation but can provide information about performance when combined with other measures (eg, to produce efficiency measures) or standardised by population or spatial area to enable benchmarking.

Collection of service trip and kilometre data is currently well established, with these measures included in NZTA monthly reporting requirements. We recommend this data continues to be collected. Service hours provides additional information that can be relevant given that hours of service, along with distance travelled, are important inputs into service costs.

We recommend a new capacity kilometres measure is established and is calculated by multiplying service kilometre measures per mode by nationally consistent average capacity factors that can be established by

NZTA (similar to the Federal Transit Administration's use of 'capacity equivalent factors' to calculate public transport capacity).

Like network structure measures all three of the service trips, kilometres and capacity measures should be broken down by the following dimensions to provide useful information:

- mode
- network component (region, sub-region, contract unit)
- service type (eg, urban rapid, urban frequent etc categories consistent with NZTA RPTP guidelines (NZ Transport Agency Waka Kotahi, 2024)).

We note that the recommended measures would need to be applied differently for on-demand services and care would be needed in comparing between on-demand and regular scheduled service provision.

# 5.4 Fleet and workforce measures

This category of measures provides baseline information about the size and quality of multi-modal vehicle fleets used to operate public transport (buses, trains, ferries and other types of vehicles) and aspects of the front-line workforce operating services. While fleet and workforce are distinct categories, we have grouped them to reflect the relationship between vehicles and the workforce that operates them. This is also consistent with categorisation of NZTA's existing monthly reporting requirements for PTAs.

Measures of fleet quality have relationships to some measures within our 'customer experience' category and the 'on-vehicle comfort' subcategory. We use the 'fleet' category for measures of the fleet as an input into public transport operations (eg, the scale of the fleet and physical vehicle features), while 'on-vehicle comfort' measures deal with aspects of fleet operation including customer perceptions of fleet quality and vehicles in operation (eg, levels of crowding).

## 5.4.1 Fleet

### 5.4.1.1 Literature and practice

Our review of key literature on public transport performance measurement frameworks generally found little reference to measures of fleet quality as core measures of public transport performance. However, Kittleson & Associates et al. (2003) include a category of 'maintenance' with several measures of the extent of maintenance and breakdowns for public transport fleets.

Our review of selected case studies of performance measure frameworks in practice also found limited use of fleet measures (although more extensive use of measures related to customer experience of fleet quality, discussed further in Section 5.6.4). The US Department of Transportation Federal Transit Administration's national transit database collates data from public transport agencies on several fleet measures under their categories of 'vehicle and facility asset inventory' and 'asset condition and performance', including counts of vehicles in service, active fleet vehicles by fuel type, 'useful life' of vehicles and replacement cost of vehicles.

Current NZTA monthly reporting requirements for PTAs include collating an inventory of public transport vehicle fleets with counts of vehicles classified by mode, method of propulsion and by whether vehicles have step-free access.

Fleet quality and features are important elements of public transport service contracts and contract negotiations with operators. NZTA's requirements for urban buses (known as RUB) set standards for fleet quality and features. These standards and the ability for quality to be specified through contract negotiations

may mean there is less need for ongoing performance measurement of the presence of particular fleet features.

### 5.4.1.2 Recommended fleet measures

We recommend that measures of fleet include a consistent approach by PTAs to collating basic fleet inventory information, including information on critical characteristics of the fleet that contribute to customer or other outcomes. Collation of fleet inventory with vehicle classified information, by capacity, age bracket, propulsion type and availability of step-free access, would allow for reporting against the following five measures:

- 3.1.1 Number of vehicles by capacity (as per NZTA RUB capacity classifications)
- 3.1.2 Percentage of vehicles by age bracket
- 3.1.3 Percentage of vehicles by vehicle type (by propulsion and emissions profile, eg, Euro 3,4 etc)
- 3.1.4 Percentage of vehicles with step-free access
- 3.1.5 Percentage of vehicles with real-time audio and visual stop announcements.

We also considered a broader range of measures dealing with multiple other physical features of vehicles. However, we concluded that there would be little value in such measures, as vehicle standards for public transport are already well-established through policy mechanisms such as the RUB.

## 5.4.2 Workforce

### 5.4.2.1 Literature and practice

As with measures of fleet, workforce measures generally do not feature prominently in literature on public transport performance measurement frameworks.

Our review of international and New Zealand practice found that workforce measures are often motivated by interest in addressing problems of driver shortages for buses. Recent New Zealand experience with bus driver shortages has seen increased interest in measures that help forecast workforce shortage issues – for both PTAs and for NZTA with its national oversight role.

NZTA's current monthly reporting requirements for PTAs seek data on the number of FTE staff, with reporting on both 'actual' and 'target establishment', intended to indicate any shortages of staff for efficiently and reliably delivering public transport services. This measure defines staff as bus drivers only for bus modes, drivers and on-board staff for trains, and skippers and deckhands for ferries. Some PTAs report this type of information as part of regular performance reporting, for example Metlink tracks the number of bus drivers employed against target within its monthly performance reports (Metlink, 2024).

NZTA has recently investigated a more comprehensive suite of measures for workforce monitoring. However, this set of measures had not at the time of writing been confirmed, nor had consistent collection of data by PTAs been implemented. This work underway has identified the following four focus areas for measurement: driver workforce; retention and recruitment; pay, hours of work and shift structure; and driver safety.

Our review of international case studies of public transport performance measurement in practice found workforce-related measures included in some agency's headline reporting. For example, Transport for New South Wales includes 'bus driver vacancies' as one of five headline measures in its regular bus performance reporting. MTR Corporation includes several measures related to its overall workforce (rather than frontline public transport operations workforce), for example, measures of staff turnover.

### 5.4.2.2　Recommended workforce measures

Table 5.3 lists recommended workforce measures for consistent collation by PTAs. These are a subset of measures considered by NZTA in its development of a comprehensive suite of public transport workforce statistics. The five measures are considered to cover the most important aspects of workforce and be feasible to collect. We recommend the focus of all measures should be on frontline operations personnel rather than the broader workforce. The availability and quality of these personnel is most directly related to customer experience of public transport services. The definition of 'workforce' in the measures below is recommended to be consistent with the definition of 'staff' in NZTA's current monthly reporting requirements for PTAs, reflecting the focus on frontline staff.

Table 5.3　　Recommended workforce measures

| Measure | Rationale for inclusion in framework |
| --- | --- |
| 3.2.1 Workforce: actual as percentage of target | Indication of staff shortages for operating public transport services |
| 3.2.2 Workforce by duration of employment | Indication of level of experience of public transport staff |
| 3.2.3 Workforce turnover: percentage of total FTE exiting workforce annually | Indication of level of staff satisfaction |
| 3.2.4 Percentage of split shifts | Indication of attractiveness of employment in frontline public transport service roles |
| 3.2.5 Number of safety and security incidents impacting workforce | Indication of health and safety performance for staff in frontline public transport service roles |

# 5.5　Infrastructure measures

The infrastructure category of measures is the final input category in the framework (alongside the financial, network, fleet and workforce categories). Measures in the infrastructure category provide information about the extent and quality of infrastructure for public transport services. We distinguish between two types of infrastructure:

- customer facilities: bus stops, train stations, ferry terminals, interchanges and other customer facilities
- running way: the linear infrastructure on which some public transport services operate (eg, bus lanes, railway tracks).

The infrastructure category of measures focuses on physical characteristics and features of infrastructure, rather than the operational performance or customer perceptions of infrastructure. This is consistent with the other input categories of measures. Several measures included in the customer experience category have relationships to the quality and features of public transport infrastructure (eg, travel speed, reliability, information provision, safety and security, and comfort). Measures of customer experience and operational performance of infrastructure are included in the customer experience category.

Given the focus of measures in this category on physical characteristics of infrastructure, measures are generally inventory-type indicators that would be measured relatively infrequently given that changes in infrastructure provision happen gradually (compared with more regular monitoring of operational aspects of public transport performance).

A third potential category of infrastructure could be termed 'operational' infrastructure. It includes facilities and assets that do not generally involve a customer interface, such as vehicle layover facilities, workforce rest and meal break facilities, vehicle charging facilities, depots, vehicle maintenance facilities, workforce

facilities and backend technology systems. This subcategory could be added to the measures framework if meaningful measures of performance of this type of infrastructure are available and viable to collect (eg, level-of-service indicators for these type of assets). We suggest that planning and managing this type of infrastructure is more usefully guided by asset management planning processes rather than a performance measurement framework.

## 5.5.1 Customer facilities

### 5.5.1.1 Literature and practice

Measures of public transport facilities provision and quality are generally not identified as core performance indicators for public transport systems within the key international literature. This likely reflects that performance measurement frameworks tend to focus on the outputs or outcomes that result from infrastructure (eg, reliability, service speed) rather than the physical provision of infrastructure. The only facilities-related measure included in Kittleson & Associates et al. (2003) approximately 50 core measures for agencies is 'stop accessibility'. The European Committee for Standardization's (2002) public transport service quality standard identifies a more comprehensive range of 'quality criteria' related to facilities, but does not specify suggested measures for these criteria. Relevant criteria include:

- accessibility of stations, stops and transfer points
- availability of information and staff
- availability of seating at stops and stations
- 'ambient conditions' at stops and stations, including weather protection, cleanliness and noise
- 'complementary facilities' at stations, including toilets, luggage and refreshments
- security features, including lighting and staff presence
- safety features, including handrails and safeguarding by staff.

None of the public transport agencies covered by our case studies of international practice report on facility provision or quality as part of their headline measures for public transport system performance. However, as with other input-type measures, the US Department of Transportation Federal Transit Administration's (2023) national transit database provides an example of a national-level agency collating inventory-type information about public transport facilities. For example, annual reporting on the database includes measures of station accessibility and condition assessment of facilities.

Station and stop accessibility and safety are the most common features of public transport facilities currently measured as part of New Zealand public transport performance measurement frameworks. For example, the NZTA's *Land Transport Benefits Framework* includes the measure accessibility – public transport facilities, which is described as the number of bus stops and train stations that are 'fully accessible' (NZ Transport Agency Waka Kotahi, 2024d), but 'fully accessible' is not defined. Facility quality measures are uncommon within PTAs' RPTPs, but the Waikato Regional Council's RPTP includes a measure of 'safety and quality of bus stops' (Waikato Regional Council, 2022). NZTA's current monthly reporting requirements for PTAs do not include any measures related to public transport facilities.

Generally, measures of facility quality do not feature prominently in New Zealand measurement frameworks. This may reflect that responsibility for bus stops is generally with local authorities rather than regional councils who are PTAs and generally hold responsibility for public transport performance measurement. It may also reflect that measurement tools may be better suited to reporting on operational performance rather than collating inventory type information on physical aspects of facility quality.

### 5.5.1.2 Recommended customer facilities measures

NZTA's public transport interchanges and stations design guidance (NZ Transport Agency Waka Kotahi 2023) specifies level-of-service expectations for different stop facility classifications (interchange, premium, intermediate, standard and basic stops or stations). This includes lists of required and desirable features. We recommend this is used as the basis for the following new measure:

- 4.1.1 Percentage of stops, stations, interchanges and terminals that meet required features according to their stop classification (consistent with NZTA interchanges and stations design guidance).

This measure ensures that a wide range of factors and features that contribute to effective customer facilities are considered. It would require detailed inventory information on stop and station features to be collated by PTAs and RCAs to evaluate consistency with NZTA design guidance. While this adds data collection effort to existing practice, there is value in systematically understanding the status of customer facilities as they have an important influence on customer experience of public transport.

## 5.5.2 Running way

### 5.5.2.1 Literature and practice

Like public transport facilities, measures of the provision or quality of public transport running way are relatively uncommon in the international literature and practice for public transport performance measurement. The US Department of Transportation Federal Transit Administration's (2023) national transit database collates information on 'miles of fixed guideway' (eg, rail tracks, tram tracks, busways).

In New Zealand, measures of the kilometres of bus-priority lanes are included in both NZTA's statement of intent (NZ Transport Agency Waka Kotahi, 2024f), as a Vote Transport appropriation measure, and in Auckland Transport's statement of intent (Auckland Transport, 2024). NZTA does not currently collate information on public transport running way provision.

### 5.5.2.2 Recommended running way measures

We recommend that measures related to running way focus on a simple inventory of the kilometres of priority running way for buses, trains and other public transport vehicles. Consistent collation of this information by PTAs will provide baseline information about the extent of priority running way provision and enable comparison over time and between regions. The following measure is recommended:

- 4.2.1 Kilometres of bus lane, special vehicle lane or railway line in passenger service.

The following measure can be derived from network measures and geo-spatial information on priority running way. It will allow for tracking of the extent of services operating on priority running way:

- 4.2.2 Proportion of scheduled bus and train service/seat km on dedicated or priority running way (bus lane, special vehicle lane or railway line).

## 5.6 Customer experience measures

The customer experience category of measures aims to comprehensively capture measures that provide information about all critical (and measurable) factors that contribute to public transport customer experience. Within our framework we treat 'customer experience' as one of three subcategories of 'service delivery', alongside 'service use' and 'efficiency'. We identify several contributors to customer experience, that build on findings from our review of international literature and practice. Various elements of customer experience are identified by the key international literature on comprehensive public transport performance management

frameworks with commonly identified contributors including comfort, safety and security, travel time and information provision (see the 'service quality' row of Table 2.1 in Section 2.3.2).

Table 5.4 summarises the subcategories of customer experience measures by which we organise our framework. The remainder of this section is organised by these categories.

**Table 5.4      Customer experience subcategories within framework**

| Customer experience subcategory | Summary description |
|---|---|
| Service span and frequency | How frequently services operate and over what hours of the day and days of the week |
| Travel time | How long it takes to travel by public transport between locations |
| Reliability | Extent to which services operate in a way that aligns with expectations of journey time |
| Comfort | Extent to which customers feel at ease and are provided with amenities at all stages of the journey |
| Information | Extent and quality of information provided at all stages of the journey |
| Safety and security | Extent to which public transport journeys are safe and secure including users' perceptions |
| Cost to customer | Actual and perceived financial costs of using public transport from a customer perspective |
| Overall experience | Overall customer and wider community perceptions of public transport |

Our selection of recommended measures for these customer experience categories generally aims for a combination of measuring operational activity (more 'objective' measures) and people's perceptions (more 'subjective' measures).

For perception measures, we generally favour building on the use of the nationally standard customer satisfaction survey as prescribed by and specified in its current form in NZ Transport Agency Waka Kotahi (2022). We favour this as its use is well established in practice, data is robust in reflecting actual users of public transport, and implementation does not add significant new data collection or analytic effort. The existing customer satisfaction survey asks about various factors relevant to our customer experience subcategories.

We are, however, aware of limitations with measuring satisfaction of existing customers, rather than perceptions of the broader community (including people who currently do not regularly use public transport). Use of customer satisfaction surveys may miss a set of different perceptions held by people who are not regular users of public transport (eg, regular customers may be more satisfied than occasional customers or people who never use public transport).

We include some perception measures based on broader community surveys (eg, in the overall experience subcategory), but recommend further investigation into extended use of broader community surveys to capture perceptions of both existing public transport customers and a broader set of potential customers. NZTA's journey experience monitor is an existing and broad community survey, and we recommend some measures sourced from this. The inclusion of measures that distinguish between existing customers' and the broader community's perceptions of public transport across specific factors (such as the subcategories in this section) are very important for understanding the factors that need to be addressed to encourage increased use of public transport.

## 5.6.1 Service span and frequency

### 5.6.1.1 Literature and practice

Measures of frequency and span provide information about how often public transport services operate and the hours of the day and week at which they operate. Kittleson & Associates et al. (2003) note that typical measures of frequency are 'public transport vehicles per hour' or the reciprocal 'headway' (which measures the time between services). Frequency is usually measured at a specific location (ie, at a particular stop or station) or on a route between locations. Measures of scheduled frequency and span of service are only relevant to be measured periodically (ie, not more often than annually), as the measure will only change with changes to service schedules. Customer perceptions may be measured more frequently. Frequency and span are generally not measured at an aggregate network scale.

Our review of key international literature on public transport performance measurement frameworks, international and local practice found limited inclusion of frequency and service span measures in headline reporting. This may reflect that it is challenging to establish legible measures of average service frequency or span for measuring whole-of-system performance (eg, at a city or regional scale). These measures are more meaningful and comprehensible at a route scale.

Transport for London's bus performance reporting (Transport for London, 2025a) includes a measure of 'average scheduled wait time' for high-frequency bus services, which is aggregated across the network.

The only frequency or span-related measure currently used for system-wide performance monitoring in New Zealand is part of the nationally consistent customer satisfaction survey established by NZTA and required to be implemented by PTAs (NZ Transport Agency Waka Kotahi, 2022). The survey includes a question asking customers to rate their level of satisfaction with 'how often services run'.

Measures of service frequency and span have relationships with several other measures in our framework.

- Network measures (Section 5.3) include measures such as route km, service km that are intended to be disaggregated by service type (eg, urban rapid, urban frequent etc categories, consistent with RPTP guidelines (NZ Transport Agency Waka Kotahi, 2024)). These service types are tied to minimum levels of frequency and span of service and provide information about the proportion of the network operating at different service levels.
- Network coverage measures (included in the transport system outcomes category, Section 5.9) are also intended to be disaggregated by service type allowing for reporting on the proportion of the population and jobs within certain distances of public transport stops served by services operating at different levels of frequency and span.
- Reliability (another category of customer experience, Section 5.6.3), which includes measures of the extent to which customers' expectations of frequency or scheduled frequency are met in actual operations.

### 5.6.1.2 Recommended service span and frequency measures

We recommend the following measures of customer satisfaction:

- 5.1.1 Customer satisfaction of public transport system frequency
- 5.1.2 Customer satisfaction of service span.

We recommend that the current customer satisfaction measure of frequency included in NZTA requirements for PTA customer satisfaction surveys is used as the primary frequency measure. This provides an indication of how well the public transport system meets customer expectations for frequency of service.

We recommend this existing measure is supplemented by an additional customer satisfaction measure of service span. The hours and times of day at which a service is available is an important contributor to customer satisfaction and collection of this measure can assist with network planning.

Both these measures should be reported on periodically (ie, not more often than annually) as part of regional and national-level system performance monitoring. These measures are only likely to change significantly with changes to timetables.

We considered the value of aggregate average service frequency or span measures (eg, average service frequency for all stops/ stations in a network or on selected routes). However, we concluded that a network-wide average measure would aggregate information to such an extent to not be meaningful. We also concluded that included a measure of frequency on selected routes within the framework presents challenges of defining the routes on which the measure should be collected. That does not, however, negate the value of PTAs using such measures on routes or corridors that they select.

We considered the network (measure 2.1.2) and network coverage measures (measures 8.5.1 to 8.5.3) provide useful complements to understanding the extent of different levels of service frequency and span on networks – so long as these measures can be disaggregated by consistently defined service levels. These measures allow, for example, tracking in the proportion of the population living within easy access of a high-frequency service.

## 5.6.2    Travel time

### 5.6.2.1    Literature and practice

The amount of time taken to travel between locations is a key determinant of the customer experience of public transport. Travel time measures are identified as relevant by most of the international literature we reviewed that identified comprehensive public transport performance measurement frameworks.

Travel time measures are related to measures of access (within which are embedded information about travel time). Access measures are included in other parts of the framework and discussed in Section 5.9. Access measures integrate measures of total journey time, including walk time to and from stops and waiting time at stops. This section of measures focuses on in-vehicle travel time.

Kittleson & Associates et al. (2003) note that travel time measures can be expressed as units of time or as rates of travel speed. In identifying a set of approximately 50 core indicators for agencies measuring public transport performance they prioritise 'transit-auto travel time' as the core travel time indicator. They also identify 'travel time' and 'system speed' as other measures. They view the 'transit-auto travel time' measure as most important from a passenger perspective, as it provides information about the travel time competitiveness of public transport against private vehicle alternatives.

Green and Espada (2015) include 'operating speed' as a core category of public transport levels of service, and suggest measures of speed use the level of exclusivity of public transport right of way and stop frequency as a proxy for measuring travel speed.

Average public transport operating speed is reported on as a core measure of public transport system performance by some of the agencies in our review of international practice. Transport for London (2025a) reports on average system-wide bus speed, tracking changes over time. The US Department of Transportation Federal Transit Administration's (2023) national transit database reports on 'average revenue speed' (revenue speed being speed while in revenue service) by mode at a national-level, aggregating information collated from local public transport agencies. The International Bus Benchmarking Group (2023) uses 'average commercial speed' as one of a set of core indicators to compare performance of bus systems between cities.

Our review of New Zealand practice found no PTAs regularly reporting average travel speeds or public transport travel times as part of headline reporting on public transport system performance. Some PTAs are, however, likely to be monitoring these measures for internal use. NZTA's monthly reporting requirements for PTAs do not include any requirements for collection of information on travel time or speeds. Customer satisfaction with travel time is collated nationally and the public transport customer satisfaction survey established by NZTA includes a question asking customers to rate their level of satisfaction with 'the travel time (considering the distance you travel)' (NZ Transport Agency Waka Kotahi, 2022). NZTA's journey experience monitor survey also includes a question related to travel time: 'How acceptable to you was the time it took to complete this journey?'.

#### 5.6.2.2   Recommended travel time measures

We recommend the following travel time measures for inclusion in our framework:

- 5.2.1 Average operating speed
- 5.2.2 Percentage of customers satisfied (rating of 6+ out of 10):[3] travel time (last trip).

The customer satisfaction measure is consistent with the established NZTA customer satisfaction survey required to be used by PTAs. The average operating speed measure is a new measure that is not in established use in New Zealand practice, but readily calculable from operator data sources.

Average operating speed should be disaggregated by mode, time of day and service type (eg, rapid or frequent etc services) and provides information that can be easily aggregated at a national level while also allowing for benchmarking between regions and tracking of trends over time. Travel time is an important contributor to public transport customer satisfaction, and operating speed is a proxy for that and the degree and quality of running way infrastructure (with faster speeds suggesting better quality running way including less disruption from traffic congestion). Tracking this measure over time (eg, years) can help understand the competitiveness of public transport relative to other modes, help identify the need for priority infrastructure, and contribute to measuring the impact of investment in public transport priority infrastructure. Actual operating speed should be relatively feasible to collect with GPS vehicle tracking devices.

Other measures of travel time may have value for PTAs but are not recommended for inclusion in the framework. Travel time measures are relevant to specific routes or corridors and can be used to track changes in performance over time (however, aggregate route-level travel time measures are not necessarily appropriate for identifying specific bottlenecks). Travel time in relation to private-vehicle travel time is also relevant for measuring public transport performance and competitiveness on specific corridors or between selected origin-destination pairs. This type of comparative travel time measure should consider not just on-vehicle travel time but access or egress and waiting time for public transport services.

### 5.6.3   Reliability

#### 5.6.3.1   Literature and practice

Measures of public transport reliability aim to reflect the degree to which public transport services operate in a way that aligns with users' expectations of journey time. Vincent (2008) states that:

> *Reliability relates to an uncertainty in the time taken to travel from the start to the end of a person's journey. For a public transport journey, reliability can affect users in one of two ways:*

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[3] For all customer satisfaction measures in the customer experience category we suggest defining a 'satisfied' customer as one that provides a rating of 6 or more out of the 10-point rating scale included in the existing nationally standard NZTA public transport customer satisfaction survey.

*as a delay when picking up the passenger and as a delay when the passenger is on the service. One or both of these sources of unreliability causes passengers to arrive at their destination at a different time than scheduled.* (Vincent, 2008, p. 7)

Vincent (2008) distinguishes between the following terms related to public transport reliability:

- punctuality – adherence to scheduled arrival or departure time
- cancellations – services that are cancelled either before starting or during the trip
- variability – spread in travel time or arrival, departure and waiting times.

Building on these concepts, measures of reliability can focus on the following distinct, but related, elements; the extent to which services:

- operate at all (ie, extent of unplanned cancellations)
- operate on time (ie, punctuality)
- operate with limited travel time variability.

We note that including all these elements under the umbrella term of 'reliability' is distinct from existing New Zealand practice that distinguishes between punctuality (on-time performance) and reliability (the extent to which services operate at all). Our framework suggests bundling these concepts under reliability as an overarching category.

Each of these elements can be represented by various measures. Rashidi et al. (2018) review international literature and practice in measuring the travel time variability aspects of reliability. They focus on 'in-vehicle' travel time predictability as part of research to identify recommended measures for application in New Zealand with a particular focus on measures that allow for inter-modal comparison of travel time predictability between road-based and public transport modes. Their review finds four categories of measures for travel time variability:

- schedule adherence (eg, public transport service travel times within a threshold of scheduled travel time)
- statistical ranges (eg, standard deviations of travel time)
- buffer time (eg, proportion of average travel time that needs to be allowed for as a 'buffer' to account for worst-case travel times)
- tardy trips (eg, measures of delay for public transport customers).

They find that schedule-adherence measures are most commonly used in practice but recommend buffer time measures as most relevant for measuring in-vehicle travel time variability in a way that enables inter-modal comparisons.

Rashidi et al. (2018) note that the relevance of different measures relates to the perspective from which performance is being measured. Measuring the reliability performance of public transport operators as part of a contract monitoring regime, for example, may involve using a different set of measures than for understanding customer experience of reliability.

Our review of key literature that attempts to establish holistic public transport performance measure frameworks finds that most of these frameworks include measures of reliability, confirming it is an important component of performance measurement. Most reliability measures identified are schedule-adherence measures (eg, on-time performance, which was identified as a core measure of public transport performance together with 'missed trips' by Kittleson & Associates et al. (2003), punctuality (European Committee for Standardization, 2002; International Bus Benchmarking Group, 2023), and on-time arrival (Henning et al., 2011)). Green and Espada's (2015) level-of-service framework focuses on travel time variability as the measure of reliability, while the National Association of Transportation Officials (2018) identifies several

travel time variability and delay indicators as alternative reliability measures to the more conventionally used schedule-adherence measures. Key measures recommended in this literature and organised by category are summarised in Table 5.5.

**Table 5.5    Reliability measures recommended in key literature on public transport measurement frameworks**

| | Missed service | Schedule adherence | Travel time variability | Delay |
|---|---|---|---|---|
| Kittleson & Associates et al. (2003) | Missed trips | On-time performance | Reliability factor | |
| European Committee for Standardization (2002) | | Punctuality | | |
| Henning et al. (2011) | | On-time arrival | | |
| Green and Espada (2015) | | | Travel time variability Level of service | |
| National Association of Transportation Officials (2018) | | | Travel time range Excess headway | Excess wait time Excess journey time |
| International Bus Benchmarking Group (2023) | | Punctuality | | |

Our review of current New Zealand practice finds schedule adherence (however defined) and missed or cancelled trip measures are the most commonly used measures of public transport reliability. Currently, NZTA specifies three reliability-related measures against which PTAs should report to NZTA on a monthly basis: cancelled services, on-time departures, and on-time departures and arrivals. There is inconsistency in the way that the terms 'reliability', 'punctuality' and other related terms are used among PTAs. For example, Auckland Transport uses the term 'reliability' for a measure of the percentage of services that start according to schedule and 'punctuality' for a measure of the percentage of services that start and end according to schedule. Our framework proposes using the term 'reliability' as an overarching category for a range of measures that include currently used 'reliability' and 'punctuality' measures in addition to other new measures.

Our review of case studies of international practice also finds that schedule-adherence measures are common. There is extensive variation in precisely how schedule-adherence indicators are defined, the thresholds for 'on-time' performance that are considered acceptable, and definitions for different modes. For example, TransLink Metro Vancouver measures 'on-time departure' for low-frequency bus services, defined as buses leaving within 1 minute early to 3 minutes late of scheduled departure time at the route origin point (TransLink, 2025). Translink Queensland measures 'on-time' performance for trains defined as services that reach their end destination on the line within 4 to 6 minutes of schedule (Translink Queensland, 2025).

Some public transport agencies use different measures for high- and low-frequency bus services. For example, Transport for London uses an 'excess wait time' measure for high-frequency services but a schedule-adherence measure for low-frequency services (Transport for London, 2025a). Similarly, TransLink Metro Vancouver uses a 'service regularity' measure for high-frequency services (defined as percentage of services arriving at stops between 0% and 120% of scheduled headway). This application of measures reflects that for high-frequency services schedule adherence is less relevant for customers than service regularity and wait time (TransLink, 2025).

Use of missed trips or lost service measures are common internationally. For example, Transport for New South Wales (2025) reports on service cancellations (percentage of scheduled services not operated at first stop). Transport for London (2025a) and TransLink Metro Vancouver (TransLink, 2025) report on lost service for buses as a proportion of service kilometres rather than proportion of trips.

Delay-type measures aim to provide a better reflection of the customer experience of reliability. Our review of practice found these type of measures were less commonly used. Transport for London (2025a) is an exception and reports on various indicators of wait time for high-frequency bus services. For example, excess wait time across its network (the average difference between scheduled and actual wait time at each stop) and percentage chance of waiting at various time bands. For its London Underground operations, Transport for London reports on 'lost customer hours', a measure that accounts for service disruptions of more than 2 minutes and modelled numbers of passengers impacted.

Our review of international practice found no instances of travel time variability indicators being publicly reported on as headline measures of reliability. This is not to say that such measures may not be used by operators for internal operational monitoring. The lack of use of these type of indicators may reflect that travel time variability may be less easily conveyed in simple form through single measures.

### 5.6.3.2 Key reliability measures considered

Table 5.6 lists key measures considered for inclusion in our framework. For each, it lists examples of existing use in New Zealand or internationally or literature references. It assesses the indicators' relevance to various purposes and against several key success factors and recommends whether the measure should be included in the framework.

**Table 5.6    Assessment of potential measures of reliability**

| Reliability subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| Missed service | Operated (or cancelled) trips: percentage of scheduled trips operated (or cancelled) | NZTA PTA monthly reporting requirements; identified as core measure by Kittleson & Associates et al. (2003) | Well-established measure in common use and identified as important in literature. Relevant across multiple levels of oversight. | Yes (measure 5.3.1) |
|  | Operated (or lost) service: percentage of scheduled service kms operated (or lost) | Transport for London (2025a) bus monitoring; TransLink Metro Vancouver bus monitoring (TransLink, 2025) | Similar to operated trips but using service kms; provides additional information (ie, adds weight to longer trips operated or cancelled). Requires additional data and analytical effort compared with established operated trips measure, but feasible. | Yes (measure 5.3.2) |
| Schedule adherence (all potential measures require definition of a time threshold or window that constitutes 'on- | On-time departure: percentage of operated trips departing from origin on time | NZTA PTA monthly reporting requirements; TransLink Metro Vancouver bus monitoring (TransLink, 2025) | Well-established measure in common use in New Zealand and internationally. Particularly relevant to operator oversight, as operators have more control over on-time departure than on-time performance at other stages of a route. Compared with some other | Yes (measure 5.3.3) |

| Reliability subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| time'; for example, less than 1 minute early and 5 minutes late compared with scheduled time) | | | measures, it has less connection to customer experience of reliability as it only measures on-time performance at route origin and provides no information about schedule adherence throughout route. | |
| | On-time service: percentage of operated trips departing from intermediate timing points on time | | Not commonly used but provides additional information to some other schedule-adherence measures as it potentially measures on-time performance at all stops. Requires more data and analytic effort compared with more established reliability measures, but feasible. | Yes (measure 5.3.4) |
| | On time arrival: percentage of operated trips arriving at destination on time | Henning et al. (2011); Translink Queensland (2025) (trains) | Less established than other schedule-adherence measures in New Zealand. Has advantages over on-time departure in having a closer link to customer experience of reliability. | No |
| | On-time departure and arrival: percentage of operated trips departing from origin and arriving at destination on time | NZTA PTA monthly reporting requirements | Provides the most information of the established schedule-adherence measures in New Zealand. Relevant across multiple levels of oversight. Trips that are on time at both route origin and destination are more likely to be on time throughout their route than those on time at just the origin or destination point. | Yes (measure 5.3.5) |
| | Run-time ratio: ratio of average observed run time to scheduled run time | Kittleson & Associates et al. (2003) | Not commonly used in New Zealand or internationally. Compared to on-time departure and arrival measure, provides some additional information about extent of variation from schedule (rather than whether trip time is within a defined threshold). | No |
| | On-time satisfaction: percentage of customers satisfied (rating of 6+ out of 10); last trip arriving and departing on time | Auckland Transport onboard customer survey | Not commonly used in New Zealand or internationally. Data collection can be easily incorporated into a broader customer satisfaction survey. As a customer perception measure it can supplement service operation measures | Yes (measure 5.3.7) |

| Reliability subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| | | | and may highlight additional issues. | |
| Travel time variability (by corridor or route origin to destination) | Reliability factor or trips within buffer time: percentage of trips no more than x% higher than average travel time | Kittleson & Associates et al. (2003); Rashidi et al. (2018) | Not commonly used. Provides similar information to on-time arrival or on-time arrival and departure measures. Can be used to compare performance of public transport against other modes. | No |
| | Travel time range: range of travel time (mins) between median, and x (eg, 95th percentile early and late trips) | National Association of Transportation Officials (2018) | Not commonly used as a headline performance measure. Less easily understood, but relevant for detailed operational monitoring. | No |
| | Headway regularity: percentage of trips arriving between x% and x% of scheduled headway (eg, 0–120%) | TransLink Metro Vancouver high-frequency bus (less than 12-min headway) monitoring (TransLink, 2025); identified as core measure for large public transport systems by Kittleson & Associates et al. (2003) | Not currently used in New Zealand but used internationally. A more relevant measure of reliability from a customer perspective than schedule-adherence measures for high-frequency routes or on corridors with multiple overlapping routes. | Yes (measure 5.3.6) |
| | Excess headway: percentage deviation in time from headway goal (average all stops) | National Association of Transportation Officials (2018) | Not commonly used. Provides similar information to service regularity measure but less easily understood (ie, expressing performance in terms of percentage deviation rather than percentage of trips). | No |
| | Excess journey time/ buffer time: planned travel time (eg, 85th percentile of operated trips) as percentage of average or median travel time | National Association of Transportation Officials (2018); Rashidi et al. (2018) | Not commonly used. Provides information about the extent of travel time variability from a customer perspective. Not easily understandable. | No |
| Delay | Excess wait time or delay: average excess wait time (minutes, actual | Transport for London (2025a) high-frequency bus services performance monitoring; | Not used in New Zealand but used internationally (only for high-frequency bus routes). Requires high level of analytical effort. | No |

| Reliability subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| | minus scheduled wait time) | | | |
| | Excess passenger wait time or delay or lost customer hours: excess wait time or delay per stop multiplied by average patronage | National Association of Transportation Officials (2018); Vincent (2008); Transport for London (2025b)'s London Underground performance monitoring | Not used in New Zealand but used internationally. Provides a high level of relevant information in a single measure by combining delay with passenger volumes. Similar to excess wait time measure but requires further analytical effort to model impacts on passenger volumes and accompanying passenger delay. | No |

## 5.6.4   Comfort

### 5.6.4.1   Literature and practice

Measures of comfort provide information about the extent to which customers feel at ease while using public transport. Levels of comfort can differ between the on-board portion of a public transport journey and the portions while waiting for a vehicle at a stop or station.

A customer's comfort is influenced both by the physical features of public transport vehicles and station facilities, the way public transport vehicles are operated, and the number and behaviour of other people both on-board and at stops and stations. Comfort measures are related to measures in other categories including:

- measures in the fleet category (Section 5.4.1), which focus on physical features of vehicles that may contribute to on-board comfort
- measures in the public transport facilities category (Section 5.5.1), which include measures of physical features at stops and stations
- measures in the safety and security category (Section 5.6.6).

'Comfort' is included as a category in most of the public transport performance measurement frameworks we reviewed from the international literature, reflecting that it is an important contributor to customer experience. The European Committee for Standardization's (2002) public transport service quality standard identifies the following 'quality criteria' relevant to comfort: 'seating and personal space', 'ride comfort', 'ambient conditions', 'complementary facilities' and 'ergonomy'. The standard does not specify measures for these quality criteria.

Green and Espada's (2015) level-of-service framework for transit users identifies the following aspects of on-vehicle comfort: on-board congestion, seat availability, ride quality and comfort, and convenience features. It specifies qualitative descriptions for establishing a level-of-service rating for each aspect.

Our review of international practice found some public transport agencies reporting on comfort as part of headline performance measures, but these are less used than other measure categories such as reliability. Transport for London's (2025a) bus performance reporting includes measures of comfort on buses and at stops through responses to various questions in its customer satisfaction survey (eg, crowding, temperature, availability of seats; see Table B.1    in Appendix B). Nederlandse Spoorwegen (2025b) reports on several crowding-related measures including 'seating opportunity during peak hour' and 'occupancy rate during rush hour'.

Current New Zealand practice in measuring comfort generally involves measuring customer perceptions rather than using more 'objective' measures of physical conditions. NZTA's journey experience monitor includes the following questions; 'How comfortable or uncomfortable did you feel physically during the journey?' and 'How crowded would you say the public transport vehicle was'? NZTA's customer satisfaction survey includes a question on satisfaction with vehicle accessibility. Auckland Transport's customer survey asks questions about satisfaction with 'on-board vehicle comfort' and 'vehicle condition'.

Notably, our review of New Zealand practice found that crowding is not routinely measured by PTAs or NZTA, in contrast with its reasonably common use internationally.

### 5.6.4.2 Recommended comfort measures

There are potentially multiple factors of on-vehicle comfort that can be measured. Based on our review of international and local literature and practice we found commonly measured factors relate broadly to:

- crowding and seating availability
- ride quality
- vehicle quality and condition.

Our review found that comfort at stops and stations is generally measured by the presence of certain facilities (eg, seating, shelter, complementary facilities).

The level of accessibility (eg, extent of step-free access) on vehicles and at stops and stations is an important determinant of customer experience. We include physical accessibility measures in the fleet and public transport facilities categories and also include measures of customer perceptions of accessibility in this category.

We recommend the following measures related to on-vehicle comfort for inclusion in the framework:

- 5.4.1 Percentage of peak-period services crowded (peak number of passengers onboard each service exceeds 100% of seats available, or at least a portion of the trip)
- 5.4.2 Percentage of customers satisfied (rating of 6+ out of 10): on-board vehicle comfort on last trip
- 5.4.3 Percentage of customers satisfied (rating of 6+ out of 10): vehicle condition on last trip
- 5.4.4 Percentage of customers satisfied (rating of 6+ out of 10): vehicle accessibility (boarding and alighting) on last trip.

We recommend the following measures related to comfort at stops, stations and terminals:

- 5.5.1 Percentage of customers satisfied (rating of 6+ out of 10): stops, stations, terminals quality
- 5.5.2 Percentage of customers satisfied (rating of 6+ out of 10): stops, stations, terminals accessibility customer perception.

These measures represent a minimal approach to measuring comfort and a wider range of comfort factors may be relevant for some PTAs. The customer satisfaction measure aims to capture a broad range of factors contributing to comfort within a minimal set of measures. Customer perception measures allow for multiple factors to be considered in a single measure as opposed to measures of physical features that require multiple measures. The measure for on-vehicle comfort is consistent with one currently used by Auckland Transport but is not currently collected as part of NZTA's nationally consistent customer satisfaction survey. The measure for stop, station and terminal quality can be generated from the NZTA journey experience monitor questionnaire. This could be matched with an updated NZTA customer satisfaction survey.

The vehicle accessibility measure can be generated from the existing NZTA customer satisfaction survey. We recommend supplementing the existing survey questionnaire with a question on satisfaction of accessibility of stops, stations and terminals.

The crowding measure is new to New Zealand practice and would impose new data collection and processing requirements on PTAs. We consider there is value in a measure of crowding on peak-period services to assist with service planning and provide information on an important contributor to customer experience of public transport.

Confirming a definition and appropriate thresholds for the crowding measure would benefit from further investigation and research. The proposed definition focuses on comparing seated capacity with peak load. Other alternatives include comparing peak passenger load with physical on-vehicle space (eg, passengers per square metre), which may be more relevant across public transport modes. Feasibility of data collection for crowding measures is also an issue that requires further investigation.

### 5.6.5 Customer information

#### 5.6.5.1 Literature and practice

Measures in this category evaluate the availability and quality of public transport customer information. There are multiple aspects of public transport information that can be measured across various scales – from a single stop to system-wide. The European Committee for Standardization's (2002) public transport service quality standard identifies several elements of information contributing to service quality including information available in 'normal' and 'abnormal' conditions (ie, during periods of service disruption). It also identifies the relevance of information provided on-board public transport vehicles, at stops and stations and for pre-journey planning. Information can include timetables, real-time schedule information provided at stops, on-vehicle information about stops, maps, directional signage, information provision during disruptions about network status and replacement services.

Measures in this category have relationships to some measures in other categories within our framework. We include a measure of availability of information at stops within the public transport facilities category.

Green and Espada's (2015) level-of-service framework for public transport users defines a range of levels of service for information provision encompassing multiple factors (see Section 2.3.3).

Our review of international practice found information-related measures were included in only some agency's headline performance reporting but were generally less prominent than some other measure categories such as service use and reliability. Transport for London's (2025a) bus performance reporting includes information measures derived from customer satisfaction surveys, distinguishing between provision of information at stop and on-board (see Table B.1 in Appendix B). Transport for New South Wales (2025) bus performance reporting includes a measure of 'percentage of timetabled services that were not tracked in real time at the first transit stop of a trip' (see Table B.4 in Appendix B). Translink Queensland (2025) reports on several measures of customer satisfaction with public transport information, distinguishing between information to 'plan', 'commence' and 'complete' a trip. Nederlandse Spoorwegen (2025b) reports on 'user-friendly travel information' and 'customer review of travel information in case of delay' (see Table B.5 in Appendix B).

In New Zealand, information is measured through customer satisfaction surveys. NZTA's customer satisfaction survey questionnaire asks about satisfaction with 'ease of getting information about public transport routes and timetables' and 'information about service delays/disruptions' (NZ Transport Agency Waka Kotahi, 2022). NZTA's journey experience monitor questionnaire includes questions on: 'How easy or difficult was it to access information which could help you plan and manage this journey?' and 'How would you rate the information available to you to help you plan and manage this journey?' (NZ Transport Agency Waka Kotahi, 2024a).

Our review did not find any nationally consistent approach to measuring physical aspects or level of service for customer information provision.

### 5.6.5.2    Recommended customer information measures

We recommend the following measure for inclusion in our framework:

- 5.6.1 Percentage of customers satisfied (rating of 6+ out of 10): information available to help you plan and manage your journey on last trip.

This measure would be based on data from customer satisfaction surveys and would use information from a survey question similar to (but slightly different from) that currently included in NZTA's journey experience monitor. An equivalent survey question could be included in future versions of NZTA's customer satisfaction survey guidance for PTAs.

We recommend this measure, as using customer perception surveys allows for the various elements of information to be evaluated in a single measure rather than multiple measures of physical aspects of information provision and quality that could result in an unmanageable number of different measures. We considered a level-of-service measure that could combine elements of information quality within a rating system. However, we assessed that consistent definition and collection of data would be challenging.

## 5.6.6    Safety and security

### 5.6.6.1    Literature and practice

Safety and security measures provide information about the level of risk for public transport customers from physical injury and from security incidents (eg, physical attacks, abuse and other crimes). Measures of safety and security are relatively prominent in the international literature on public transport performance measurement frameworks. All the key frameworks we reviewed from the literature include measures in this category. This reflects that safety and security are key factors of customer experience, that agencies place importance on these factors and that there are well-established systems for collecting data on safety and security. Typical measures include counts of security incidents, crashes and injuries or fatalities from crashes. Measures in this category have some relationships with some measures in the fleet and workforce category. Measures of security and safety issues impacting workforce rather than customers are included in the workforce category.

Kittleson & Associates et al. (2003) include six safety and security measures as part of their recommended approximately 50 core measures for a public transport performance measurement framework:

- accident rate
- number of incidents of vandalism
- crime rate
- number of vehicles with specified safety devices
- passenger safety
- ratio of police officers to transit vehicles.

The European Committee for Standardization's (2002) public transport service quality standard identifies 'freedom from crime', 'freedom from accident' and 'emergency management' as contributors to public transport safety and security, with various criteria within each.

Our review of international case studies of agency performance reporting found all agencies included at least one safety and security measure in their headline reporting, as summarised in Table 5.7. Measures used are consistently either:

- customer perception measures

- counts or rates of customer injuries (by number of trips or service kilometres)

- counts or rates of vehicle collisions

- counts of security incidents (eg, issuing fines or warnings).

There is variation in the way in which injuries and incidents are defined and how counts may be transformed to rates against trips or service kilometres.

**Table 5.7    Safety and security measures in case studies of public transport agency performance reporting**

| Agency and reference | Safety measure | Security measure |
| --- | --- | --- |
| Transport for London (2025) – bus performance data | Customer satisfaction – personal safety (at stop and on-board) | Customer satisfaction – personal safety |
| Mass Transit Railway Corporation (2025) | Number of injuries requiring hospitalisation per 100 million passenger journeys | |
| TransLink Metro Vancouver accountability centre (TransLink, 2025) | Number of customer injuries requiring hospitalisation<br>Preventable bus collisions per million service km | |
| Translink Queensland (2025) | Passenger injuries<br>Customer satisfaction – feeling safe (at stop and on-board) | Number of passenger fines<br>Number of passenger warnings |
| NSW TrainLink (2025a) | Customer satisfaction – safety and security | Customer satisfaction – safety and security |
| Nederlandse Spoorwegen (2025a) | | Customer rating – social safety |
| US Department of Transportation Federal Transit Administration (2023) | Fatality and injury rate per vehicle mile<br>Derailments and collisions | |

In New Zealand, safety and security measures are used for various monitoring purposes. Like international practice, measures generally involve counts of incidents, injuries and fatalities, and measures of customer satisfaction.

For monitoring operators, PTAs are required by NZTA's procurement guidelines (NZ Transport Agency Waka Kotahi, 2022) to collect a register of incidents and survey customer satisfaction related to personal security. PTAs are also required to provide a count of incidents as part of NZTA's monthly reporting requirements for PTAs, classified by 'operations' and 'other' incidents (NZ Transport Agency Waka Kotahi, 2024e).

Some PTAs report on numbers of incidents as part of their own regular public reporting, but this is inconsistent across PTAs. Recent NZTA guidance on a suite of monitoring measures to be included in RPTPs (NZ Transport Agency Waka Kotahi, 2024b) suggests PTAs include safety and security incidents for regular reporting.

### 5.6.6.2    Recommended safety and security measures

We recommend the following measures for safety and security are used consistently for all four key purposes of public transport performance monitoring (eg, embedded in PTAs' partnering contracts with operators, used for PTAs' monthly reporting and periodic outcome reporting, and aggregated by NZTA at a national level for system-wide performance monitoring):

- 5.7.1 Number of deaths and serious injuries on public transport
- 5.7.2 Number of serious security incidents
- 5.7.3 Percentage of customers satisfied (rating of 6+ out of 10): safety and personal security on last trip.

Clear definitions of what constitutes an 'injury' and classification of injury severity are required and could be consistent with NZTA's crash analysis system. Likewise, clear definition of a serious security incident is required. The customer satisfaction measure combines perceptions of both risks from vehicle-related safety and personal security and would require revision of NZTA's customer satisfaction survey. For regional and national system-level monitoring, counts of injuries and incidents should be standardised by passenger kilometre to allow benchmarking and tracking of trends over time in the rate of incidents.

We also recommend that for regional and national system-level monitoring, safety performance of public transport is benchmarked against private vehicle travel on a periodic basis (eg, annually) to communicate the relative safety performance of public transport against other modes. Data for private vehicle travel is readily available through NZTA's crash analysis system. We recommend the following measure:

- 8.1.2 Number of injuries and fatalities per passenger km: ratio of public transport to private passenger vehicles.

## 5.6.7    Financial cost to customer

### 5.6.7.1    Literature and practice

This category of measures provides information about actual and perceived financial costs of using public transport from a customer perspective. Financial cost is a contributor to customer's experience of public transport and its relative attractiveness compared to other transport modes.

The financial cost for public transport customers is the fare charged, and measures can relate to the actual fare, measures of the affordability of fares or customer's perceptions of affordability, or the value for money of fares. Measuring cost from a customer perspective is distinct from measuring the cost of public transport from an operator or funder perspective, which treats fares as revenue rather than costs and takes account of a broad range of contributors to operating costs. Measures from this perspective are included in the 'cost efficiency' category (Section 5.8.2).

Measures of cost to customer are not prominent in the international literature on public transport performance measurement frameworks. This contrasts with common inclusion in these frameworks of measures of cost efficiency from an operator or funder perspective. Cost to customer measures are also not commonly reported by international public transport agencies as part of their headline performance reporting. Our case study review found only Translink Queensland (2025) reporting these type of measures, using a customer satisfaction rating of 'cost of trip'. While few agencies publicly report these measures, all agencies will gather detailed data about fare revenue and have good information available internally on costs to customer.

Within New Zealand practice we found cost to customer is most commonly reported on the basis of customer satisfaction surveys. We found three of the 14 PTAs report on cost to customer as part of headline reporting; Taranaki Regional Council, Greater Wellington Regional Council and Invercargill City Council all include a measure of customer satisfaction with fares or 'value for money of fares' as a core RPTP monitoring measure. Within their RPTPs, no PTAs included measures of actual costs (eg, average fare per trip or passenger kilometre or attempted to relate costs to a metric such as the minimum wage to gauge affordability).

Customer satisfaction with fares is also measured through the nationally consistent NZTA customer satisfaction survey required to be completed by all PTAs ('value for money of the fare') and through NZTA's journey experience monitor questionnaire ('How affordable would you say this journey was for you?' and 'How would you rate this journey for value for money?').

All PTAs collect detailed data on fare revenue and will likely have a good understanding of average fares charged disaggregated by user type and standardised by factors such as fare per passenger kilometre. NZTA has recently collated and analysed this data, benchmarking average fares across PTAs and comparing them with private vehicle costs as part of a recent policy discussion document (NZ Transport Agency Waka Kotahi, 2024c).

### 5.6.7.2    Recommended financial cost to customer measures

We recommend three cost to customer measures for consistent reporting by PTAs as part of periodic (eg, annual) system-level monitoring and aggregation to the national-level by NZTA, as listed in Table 5.8.

**Table 5.8        Recommended financial cost to customer measures**

| Measure | Rationale for inclusion in framework |
|---|---|
| 5.8.1 Average fare per passenger km | Provides information on financial cost to customer which is a contributor to customer's experience of public transport. Standardisation by passenger km allows for inter-regional benchmarking. Data to calculate is already collated by PTAs and NZTA. |
| 5.8.2 Cost to customer (for average distance public transport trip or per passenger km): average public transport fare as percentage of private passenger vehicle operating cost | Provides information about the relative costs of public transport and private vehicle travel. Relative costs are a contributor to mode choice and the relative attractiveness of public transport. Data to calculate is readily available, although there are a wide range of methods for calculating private vehicle costs. |
| 5.8.3 Percentage of customers satisfied (rating of 6+ out of 10): value for money of fare, last trip | Provides information about customer's perceptions of value for money. Measure is already established in NZTA's customer satisfaction survey. |

We considered additional measures that could provide an indication of affordability such as average fare per trip as a proportion of the minimum hourly wage. We considered this a valid indicator that may have specific uses, but not important enough to justify inclusion in the framework. There is likely value in further investigation of these type of measures.

## 5.6.8    Overall experience

### 5.6.8.1    Literature and practice

This category includes measures that capture information about overall perceptions of public transport. Within other categories in our framework we include several measures of customer perceptions of more specific aspects of public transport service (eg, comfort, information provision, service frequency). Like these other customer perception measures, overall perceptions are generally reported from customer survey data. They measure people's experience and perceptions rather than physical features or aspects of actual operations. As we discuss in Section 2.3, the literature on public transport performance measurement highlights the importance of measuring experience from a customer perspective and perception measures are an important way of doing this. Included in this category are measures of complaints and broader community (not just customer) perceptions of public transport.

The most common type of measure for overall perceptions referenced in international literature and practice is overall customer satisfaction. The European Committee for Standardization (2002) notes that customer satisfaction is a measure of the extent to which customer's perceptions of quality meet their expectations of 'quality sought'. Most of the international case studies of agency headline reporting on public transport performance include overall customer satisfaction measures (eg, Transport for London (2025a), Translink Queensland (2025), TransLink Metro Vancouver (TransLink, 2025), and Nederlandse Spoorwegen (2025a)). The precise questions used to generate this measure are not always clear, however Translink Queensland (2025) distinguishes between 'overall experience on last trip' and 'overall experience of the network'. Transport for London (2025a) distinguishes between overall experience on-board buses and at bus stops. All agencies report on customer's satisfaction (actual users of public transport services) rather than broader community perceptions.

Current New Zealand practice is informed by NZTA's customer satisfaction survey questionnaire, which includes questions on 'overall satisfaction with the trip' and satisfaction with 'the public transport system overall' (NZ Transport Agency Waka Kotahi, 2022). The survey is an 'on-board' survey of customers and is required to be completed at least every 3 years as part of NZTA's procurement requirements for public transport operating contracts. Some PTAs report on overall customer satisfaction as part of their regular reporting on service delivery (eg, Auckland Transport produces a monthly customer satisfaction report and Bay of Plenty Regional Council reports on overall customer satisfaction as one of its indicators in its quarterly public transport performance reporting). Our review of RPTPs found that 10 of the 14 RPTPs included overall customer satisfaction as a measure for RPTP monitoring, being one of the most commonly used measures by PTAs.

At the national level, NZTA collects measures of overall customer satisfaction across all passenger transport modes through its journey experience monitor. The survey questionnaire includes a question on the 'overall experience of the journey' and again captures perceptions of public transport users rather than those of the broader community.

### 5.6.8.2   Recommended overall experience measures

Table 5.9 lists our recommended measures of overall experience. These generally follow established practice (ie, involve data already collected through existing surveys). Overall customer satisfaction and complaints are measures relevant across all four levels of oversight that we identify. Other measures are relevant to regional and national level monitoring on a periodic basis (ie, not more often than annually). These include measures of customer perceptions of access and egress to stop legs of public transport journeys. Satisfaction with these legs of journeys is an important (albeit seldomly measured) contributor to overall journey experience. They also include a measure that aims to capture broader community perceptions of the quality of the public transport system. The most used measures of customer satisfaction have drawbacks in only measuring existing customer perceptions (which may be distinct from potential customer or broader community perceptions).

**Table 5.9    Recommended overall experience measures**

| Measure | Dimensions for reporting | Relevant levels of oversight | Existing use |
|---|---|---|---|
| 5.9.1 Percentage of customers satisfied (rating of 6+ out of 10): overall trip (last trip) | Mode, network component, customer segmentation | Operator, service delivery, regional system, national system | NZTA customer satisfaction survey |
| 5.9.2 Percentage of customers satisfied (rating | Customer segmentation | Regional and national system | NZTA journey experience monitor questionnaire |

| Measure | Dimensions for reporting | Relevant levels of oversight | Existing use |
|---|---|---|---|
| of 6+ out of 10): access to public transport stop from journey origin | | | |
| 5.9.3 Percentage of customers satisfied (rating of 6+ out of 10): access from public transport stop to journey destination | Customer segmentation | Regional and national system | |
| 5.9.4 Complaints | Customer segmentation, standard complaint category | Operator, service delivery, regional system, national system | NZTA monthly reporting requirements |
| 5.10.1 Community perception of public transport | Customer segmentation | Regional and national system | Similar to NZTA journey experience monitor questionnaire |

## 5.7  Service use measures

### 5.7.1  Literature and practice

The service use category includes measures that provide information about how public transport is used by customers. The primary measures of use are either counts of passenger boardings, trips or 'journey stages' or counts of passenger kilometres that provide information about the distance travelled by customers. Measures of public transport demand can also be related to measures of broader passenger transport demand to estimate mode share (the proportion of demand using public transport compared with other modes). Public transport demand measures can be used across a range of scales, from stop to route and aggregated up to the national level. Demand can be measured and can be disaggregated in various ways, for example, annual system-wide boardings can be broken down into measures of boardings by day of week or hour of day.

Service use measures are well-established and commonly used by public transport agencies internationally and are of particular interest to agencies and funders that use them as key inputs to service planning and funding decisions. They provide indicators of the effectiveness of providing quality services and the relative attractiveness of public transport compared with other modes. Measures such as boardings and passenger kilometres are key indicators of the core 'output' that public transport provides, moving people between places. These measures are used as inputs to derive several other measures such as efficiency measures that relate levels of outputs to inputs (following Section 5.8).

Internationally, public transport agencies report on passenger demand generally by recording passenger trips or distance travelled. Transport for London (2023b) uses passenger kilometre and journey stage measures in its core reporting on public transport demand. Linked journey stages combine to form a public transport 'trip'. Transport for London disaggregates these measures by mode, tracks, multi-year trends and reports on counts by time of day and day of week to understand temporal patterns in demand. TransLink Metro Vancouver's accountability centre uses 'boardings' as its key measure of public transport demand which it disaggregates by mode (TransLink, 2025).

Some agencies estimate public transport mode share. However, this is far less commonly reported on than demand. For example, Transport for London (2023a) produces estimates of mode share by cycle, walk, public transport and private transport. It reports these as daily total estimates for 7-day-week averages, by both trips and stages (Figure 5.2).

**Figure 5.2    Example of reporting on mode share – estimated daily trips by mode, 7-day-week average, 2000–2022, London (reprinted from Transport for London, 2023a, p. 8)**
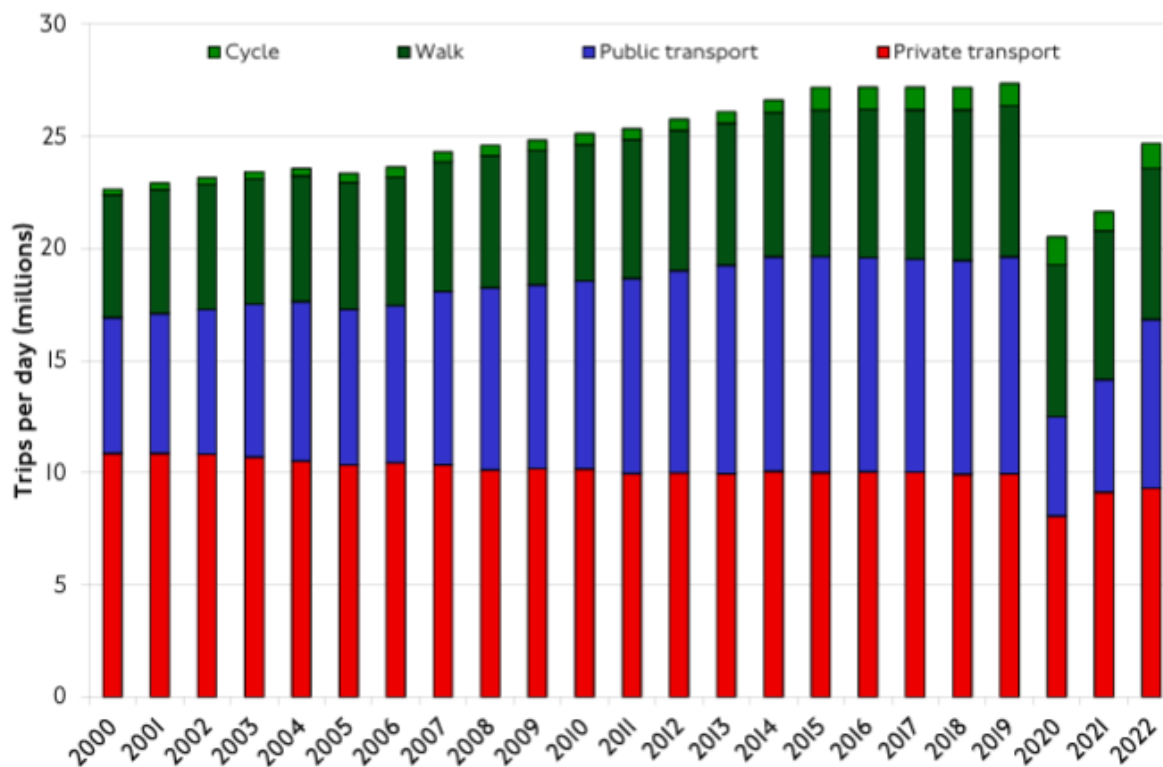


Source: TfL Strategic Analysis, Transport Strategy & Policy.

The US Department of Transportation Federal Transit Administration's (2023) national transit database is an example of a national-level government agency collating public transport demand statistics from regional public transport agencies and aggregating to national-level estimates. Its annual reporting on the database includes measures of numbers of unlinked passenger trips, passenger miles travelled and average trip length by mode. Passenger trips and distance travelled provide distinct information as shown in Figure 5.3. This figure shows that, in the USA, commuter rail accounts for about 5% of trips, but 20% of passenger distance travelled due to longer average trip lengths.

**Figure 5.3**    **Example of difference between measures of passenger trips and passenger distance travelled –**
**USA 2023 national total unlinked passenger trips and passenger miles travelled by mode (reprinted**
**from US Department of Transportation Federal Transit Administration, 2023, p. 103)**
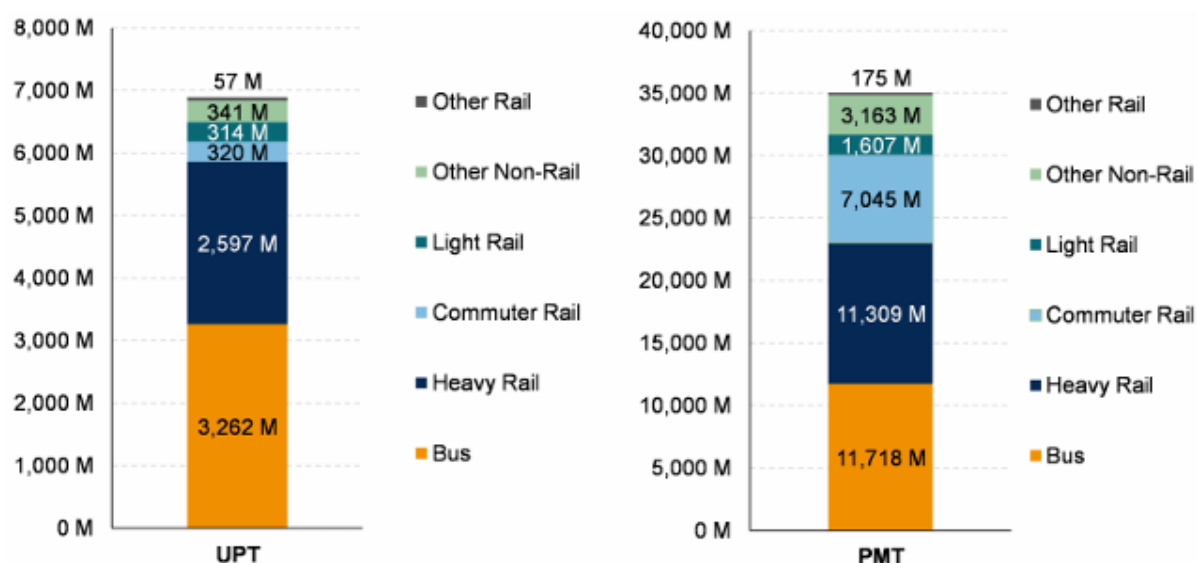


Current practice in New Zealand for measuring public transport service use follows international practice in predominantly using counts of passenger boardings and passenger kilometres travelled. Both measures are required to be reported by PTAs as part of NZTA's monthly reporting requirements. Many PTAs regularly publish these measures. For example, Auckland Transport publishes patronage reports every week in a spreadsheet format that provides daily counts of boardings by mode (Auckland Transport, 2025). It also publishes an annual bus patronage report providing daily boarding counts at a route level. Auckland Transport uses total annual public transport boardings as a key measure with associated targets in its statement of intent (Auckland Transport, 2024). Metlink publishes monthly boardings by mode and annual passenger kilometres in spreadsheet format and additional boarding data in its monthly performance reports (Metlink, 2024).

Public transport mode share measures are less used by PTAs as measures of system performance. Of the 14 PTAs, our review of RPTPs found only two PTAs included mode share measures for monitoring performance. This may reflect that mode share outcomes depend on multiple factors of the broader transport system and are less directly within the control of PTAs. Mode share measures are also more challenging to calculate, and measures available through the Census and household travel survey are updated infrequently.

NZTA uses boardings and passenger kilometre measures of public transport demand as part of its oversight of the sector. It uses total boardings as one of two measures for each of the public transport services and public transport infrastructure output classes in its statement of intent and statement of performance expectations (NZ Transport Agency Waka Kotahi, 2024f). The level of public transport demand is considered by NZTA to be a good indicator of the effectiveness of its co-investment in providing services and infrastructure. Boardings and passenger kilometres are also reported on at national and regional level on NZTA's funding and transport dashboard allowing for benchmarking between regions.

A final way in which public transport demand can be measured is through surveys of the general public asking about frequency of use. Measures from this source of data provide information about the proportion of the population that make use of public transport at different levels of regularity. NZTA's journey experience monitor questionnaire is aimed at a broad audience (not just public transport customers) and asks

respondents about use of public transport in the past 24 hours and last week. From our review of practice, we are not aware of PTAs using this type of measure in headline reporting.

### 5.7.2 Recommended service use measures

We recommend core measures of passenger boardings and passenger kilometres continue to be reported and used for oversight across all key levels of oversight (from operators through to national-level oversight). Both boardings and passenger kilometres are important to report as they provide distinct information and provide inputs to efficiency measures. These measures should be disaggregated by various nationally standardised dimensions including:

- mode
- network component (ie, region, sub-region, unit, route)
- service type
- time period
- customer segmentation.

There are established systems for collecting and analysing this data. There are future opportunities for centralised and more efficient data collection for these measures through the national ticketing system.

In addition, we recommend periodic reporting (ie, no more often that annually) on the proportion of the population that have used public transport over a range of recent time periods (eg, within the past week, month or year).This provides additional information on the breadth of public transport use across the population and is relevant to system-level oversight at a regional and national scale. There is an opportunity to use a modified NZTA journey experience monitor questionnaire to collect this data.

Public transport mode share measures are also a measure relevant to periodic system monitoring at a regional and national scale, providing information about the relative attractiveness of public transport and hence the overall effectiveness of the public transport system and are useful for tracking trends over time. Accurately estimating public transport mode share is complex from a data availability and analysis perspective. We recommend measures using both Census data (proportion of journeys to work and education using public transport) and household travel survey data (estimates of public transport share of passenger kilometres travelled).

Finally, we recommend a measure of access and egress mode to public transport stations (and potentially distance travelled). This information is not currently consistently collected in New Zealand and if collected is done so infrequently through surveys. We recommend that more systematic collection of this data could be relatively easily pursued as part of revisions to NZTA's standard customer satisfaction survey. Reporting is relevant for regional and system-level periodic monitoring and should be disaggregated by standard dimensions of mode and customer segmentation. This data can assist in planning for multi-modal integration at stops and stations.

## 5.8 Efficiency measures

### 5.8.1 Literature and practice

Efficiency measures are typically a ratio of outputs to inputs (or vice versa). Outputs and inputs can be defined in various ways. For example, typical outputs of public transport are passenger trips or passenger kilometres. Typically, inputs can be defined as operating costs or units of service supplied. Units of service supplied can also be treated as an 'output' for measures where cost is an input.

Efficiency measures are of interest to operators and funders but are not measures of performance from the customer perspective (although the general public may take an interest in efficiency measures in providing information about the efficiency of public investment in public transport).

Efficiency measures are widely used by international public transport agencies to evaluate their own operations. Kittleson & Associates et al. (2003) recommend three types of core efficiency measures as part of their overall performance measurement framework:

- 'productivity' – efficiency of service provision, defined as a measure of passengers per service hour provided
- 'cost effectiveness' – cost efficiency of service delivery to passengers, defined as operating cost per passenger kilometre travelled or per passenger trip
- cost efficiency – cost efficiency of service provision, defined as operating cost per vehicle service hour or service kilometre.

They also identify a range of other efficiency measures using various input to output ratios involving energy use, employee numbers and other factors.

The US Department of Transportation Federal Transit Administration's (2023) reporting on its national transit database distinguishes between 'service efficiency (cost per service supplied)' and 'cost effectiveness (cost per ride'. Service efficiency measures include operating expenditure per vehicle revenue mile or vehicle revenue hour. They also standardise operating expenditure with an 'operating expenditure per capacity-equivalent vehicle revenue hour', which takes account of differing passenger capacities of vehicles between modes (eg, between buses and trains). Cost-effectiveness measures include operating cost per trip or passenger mile travelled.

TransLink Metro Vancouver's accountability centre includes several headline measures of efficiency (TransLink, 2025). These include:

- service productivity – boardings per service hour
- cost per boarding – operating cost per boarding.

Nederlandse Spoorwegen (2025a) reports on measures of energy and emissions efficiency. We include consideration of these types of measures in the 'outcomes' category of our framework (Section 5.9).

The International Bus Benchmarking Group's (2023) comparison of Transport for London bus operations against a selection of other international cities used the following measures of efficiency:

- utilisation – passenger kilometres per revenue vehicle planning capacity kilometres
- cost efficiency – operating costs per vehicle revenue hour.

In New Zealand, a wide range of utilisation and cost-efficiency measures are used by PTAs and NZTA (see Table 5.10). There appears to be little consistency in the precise definitions of these measures. Our review of RPTPs across the country found that three of the 14 PTAs included some type of efficiency measure as a headline measure for monitoring their RPTP. All measures across PTAs were defined slightly differently. For example, Bay of Plenty Regional Council's utilisation measure counts boardings per in-service hour (on weekdays only) while Waikato Regional Council's counts boardings per trip, and Auckland Transport's counts the percentage of routes meeting patronage targets. Cost-efficiency measures are less used in RPTP monitoring than utilisation measures.

At the time of writing, NZTA was consulting with the sector on enhancing value for money through public transport procurement (NZ Transport Agency Waka Kotahi, 2025a). The consultation material includes proposed definitions of cost efficiency, cost effectiveness, and value for money, which may be included in a proposed new public transport procurement manual. Cost efficiency is defined as how much is spent for a certain level of effective output. Cost effectiveness is defined as how well expenditure achieves desired

outcomes, regardless of the amount spent. Value for money is defined as being a combination of effectiveness and efficiency of spend, with best value for money being obtained when desired outcomes are achieved at an efficient and sustainable price. Specific measures are not discussed in the document.

Table 5.10    Efficiency measures included in RPTPs, Auckland Transport statement of intent and NZTA RPTP development guidelines

| PTA and reference | Utilisation measures | Cost-efficiency measures |
|---|---|---|
| Auckland Transport (2024) statement of intent | Utilisation for frequent routes during peak – peak number of passengers onboard service out of all seats available | |
| Auckland Transport (2023) RPTP | Percentage of routes meeting patronage targets | |
| Waikato Regional Council (2022) RPTP | Average boardings per trip – total annual<br><br>Average boardings per trip – peak period, total annual | Net cost per passenger boarding<br>Net cost per passenger kilometre |
| Bay of Plenty (2024) RPTP performance monitoring report | Boardings per weekday in-service hour | |
| NZTA RPTP development guidelines (NZ Transport Agency Waka Kotahi, 2024b) | | Cost per passenger boarding<br>Cost per service kilometre |

## 5.8.2    Recommended efficiency measures

Measures of efficiency are related to various 'input' and 'output' measures in other categories within our framework. For example, measures in the 'service provision' category include measures of service kilometres, while measures in the 'service use' category include measures of boardings. Our recommended measures are consistent with and can be derived from measures recommended for other categories, so require no additional data collection.

Table 5.11 lists efficiency measures considered, and highlights four measures recommended for inclusion. It includes examples of current use of measures and an assessment of each. The recommended measures include two for each of the utilisation and cost-efficiency subcategories and have been selected as providing the most accurate information.

All recommended measures are relevant to both monitoring system delivery and oversight of system outcomes at a regional and national level. The two cost-efficiency measures are in also relevant to monitoring and benchmarking operator performance. The measures can be used across a range of scales, from an individual route through to aggregation of system data at a national level for assessment of trends over time.

Table 5.11    Assessment of potential measures of efficiency

| Efficiency subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| Utilisation | Boardings per operated trip | Waikato RPTP monitoring | Can be derived from measures recommended for other categories. Does not account for | No |

| Efficiency subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| | | US Department of Transportation Federal Transit Administration | differences in service route length. | |
| | Boardings per service kilometre | | Can be derived from measures recommended for other categories. Better than boardings per operated service, as accounts for differences in service route length, but not in common use. | No |
| | 7.1.1 Boardings per service hour | Bay of Plenty RPTP monitoring<br><br>Auckland Transport<br><br>TransLink Metro Vancouver | Can be derived from measures recommended for other categories. Better than boardings per operated service, as accounts for differences in length of operating time by service. Some existing use. | Yes |
| | 7.1.2 Boardings as percentage of capacity | Auckland Transport | Can be derived from measures recommended for other categories. Auckland Transport uses for peak period only. | Yes |
| | 7.2.3 Passenger kilometres as percentage of capacity kilometres | International Bus Benchmarking Group | Comprehensive measure of utilisation that accounts for differing capacities of vehicles across modes. Can be measured for peak and off-peak periods. | Yes |
| Cost efficiency | Operating cost per boarding | Waikato RPTP monitoring<br><br>TransLink Metro Vancouver | Can be derived from measures recommended for other categories. Relatively commonly used. Does not account for differences in passenger trip lengths. | No |
| | 7.2.1 Operating cost per passenger kilometre | US Department of Transportation Federal Transit Administration | Can be derived from measures recommended for other categories. Has advantages over operating cost per boarding by accounting for differences in passenger trip lengths. | Yes |
| | 7.2.2 Operating cost per service kilometre | Waikato RPTP monitoring | Can be derived from measures recommended for other categories. Does not account for differences in passenger capacity among vehicles (eg, a service kilometre of | Yes |

| Efficiency subcategory | Potential measure | Example of existing use or reference in literature | Assessment | Recommended for inclusion in framework |
|---|---|---|---|---|
| | | | a bus is treated as the same as a service kilometre of a ferry with much higher passenger capacity). | |
| | 7.2.3 Operating cost per unit of capacity kilometres | US Department of Transportation Federal Transit Administration | Can be derived from measures recommended for other categories. Has advantages over operating cost per service kilometre by standardising for differences in vehicle passenger capacity. | Yes |
| | Operating cost per service hour | US Department of Transportation Federal Transit Administration | Requires additional data collection as service hours not recommended as a measure for service provision category. | No |

## 5.9    Transport system outcomes measures

Measures in this category aim to provide information about the performance of public transport in contributing to high-level desired outcomes for the transport sector. They aim to show the extent to which public transport is effectively contributing to broad objectives such as carbon emissions reduction, economic prosperity, and healthy and safe communities. Achievement of all these outcomes is influenced not just by public transport performance but by the wider transport sector and broader economic and social factors.

We organise measures in this category by the established five transport outcomes for the New Zealand transport sector. This aligns with the research objective of establishing a framework that is consistent with the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2025f).

The following sub-sections describe our approach to selecting measures for each of these five outcomes. Our approach has been to select the best proxy indicator for showing the extent to which public transport is contributing to these outcomes. In some cases this involves repeating measures from other parts of the framework while in others it involves new measures.

Our selection builds on existing New Zealand practice where a range of measures for the sector have been identified as relevant for each of the five outcomes. Indicators from the transport outcomes framework (Te Manatū Waka Ministry of Transport, 2022) and the *Land Transport Benefits Framework* (NZ Transport Agency Waka Kotahi, 2024f) provide a starting point for identifying measures. Both these frameworks identify measures relevant to the overall multi-modal system while our framework is specific to public transport.

While outcome measures are identified at a national level there is little consistency in connecting measures to broader outcomes or attempting to measure broader impacts by PTAs across New Zealand. For example, our review of 14 RPTPs found only three included any measures related to broader outcomes; all were measures of greenhouse gas emissions from public transport operations.

Our review of the international literature on public transport performance measurement frameworks found limited examples of frameworks that explicitly attempt to link measures to higher levels outcomes. Measures were instead generally categorised by key factors of customer experience. Nevertheless, the framework developed by Kittleson & Associates et al. (2003, p. 235) identifies a 'community' category of measures and

documents several measures that assess 'transit's role in meeting broad community objectives'. Measures cover factors including the extent of mobility and access provided by public transport, service coverage by public transport, equity of service provision, environmental and economic impacts of public transport.

Our review of international practice also found few examples of agencies attempting to measure broader impacts of public transport. MTR Corporation places its measures within a broad sustainability framework, linking measures to environmental, social and economic performance. TransLink Metro Vancouver includes a category of environmental measures including indicators of emissions and energy use by its public transport operations.

### 5.9.1   Healthy and safe people

Existing measures used in New Zealand practice for this outcome include deaths and serious injuries from the transport sector, workplace injuries and emissions harmful to human health.

We recommend the following measures:

- 8.1.1 Number of deaths and serious injuries on public transport (repeated measure from our safety and security subcategory within 'customer experience')
- 8.1.2 Number of deaths and serious injuries per passenger km: ratio of private passenger vehicle to public transport.

The measure of comparative safety performance of public transport against private vehicle transport helps communicate the extent to which it is contributing to safety outcomes. The measure standardises safety outcomes on the basis of passenger kilometres travelled to enable meaningful comparison.

### 5.9.2   Resilience and security

Measures used in New Zealand practice for this outcome include the number of security incidents, customer perceptions of personal security and availability of alternative routes.

We recommend the following measures:

- 8.2.1 Operated (or cancelled) trips: percentage of scheduled trips operated (or cancelled) (repeated measure from reliability subcategory of 'customer experience')
- 8.2.2 Number of reported serious security incidents per passenger km (repeated from safety and security subcategory of 'customer experience').

We considered measures that capture the contribution that public transport makes to transport system resilience by offering an additional mode of travel but concluded that a measure of the general availability of public transport did not have a direct enough connection to the resilience and security outcome. We also considered measures of disruption to service caused by unplanned closure of public transport infrastructure (eg, due to weather events). We concluded, however, that a measure of the impact of unplanned closure that was standardised by the duration and extent of network closure or the number of passengers impacted would be challenging to calculate. We consider such measures are worthy of further investigation.

### 5.9.3   Economic prosperity

Several measures are identified in current New Zealand practice as proxies for transport's contribution to economic prosperity, including travel time reliability and access to key economic destinations provided by the transport system.

In selecting measures for this category we identified a key way in which public transport contributes to economic outcomes is in providing people with access to jobs (or conversely employers with access to labour). We recommend the following measures:

- 8.3.1 Public transport access to jobs: percentage of jobs in region within 30 and 45 minutes door-to-door travel time for the average resident, AM peak
- 8.3.2 Public transport access to jobs relative to private passenger vehicle access: percentage of jobs in region within 30 and 45 minutes door-to-door travel time for the average resident, AM peak: ratio of private passenger vehicle vs public transport.

There are various ways to define measures of access to jobs provided by public transport. For example, an alternative to the measure above is the population or proportion of a region's population within certain travel time thresholds of a key job centre (eg, the city centre). The measure we have selected is more comprehensive than a measure of access to the city centre, as city centres are typically only the location for a small proportion of a region's total jobs. We recommend that effective public transport access measures account for 'door-to-door travel time' (ie, include walk-up access and egress and waiting time). We recommend further investigation is undertaken on the most appropriate public transport access to jobs measure and that a nationally consistent analytic tool is established to allow for benchmarking between regions.

Equivalent to the measure recommended for the healthy and safe people outcome, we recommend a measure of the relative performance of public transport against private vehicles in providing access to jobs. We suspect that current measures will show public transport performing considerably worse on this measure than for private vehicles. However, tracking relative improvements of public transport over time on this measure is an important indicator of public transport playing an increasingly effective contribution to economic prosperity.

## 5.9.4 Environmental sustainability

Measures for this outcome used in current New Zealand practice include greenhouse gas emissions, vehicle fleet composition, vehicle fuel efficiency and mode share. Our review of international practice found greenhouse gas emissions from public transport operations is a relatively common measure. Energy consumption and emissions of air pollutants are other measures used. Some agencies standardise these measures by passenger or vehicle kilometre travelled.

We recommend the following measures:

- 8.4.1 Average grams carbon dioxide emitted per passenger km
- 8.4.2 Average grams carbon dioxide per passenger km: ratio of private passenger vehicle to public transport.

These measures reflect public transport's contribution to climate change mitigation objectives. Standardising carbon emissions measures per passenger kilometre allows for more accurate comparison of emissions with other modes. We also considered public transport mode share measures as relevant, as higher public transport mode share is associated with reduced carbon emissions. Mode share measures are more difficult to calculate on a regular basis. We are aware that our recommended measures are also not necessarily straightforward to calculate. Our engagement with PTAs revealed challenges in accurately calculating emissions from public transport operations. There may be potential for using standardised emissions factors that can be combined with service kilometre or capacity kilometre measures from other parts of the framework to simplify estimates of carbon emissions.

## 5.9.5   Inclusive access

Measures of inclusive access aim to provide information about how well public transport contributes to providing essential access to social and economic opportunities for all people, regardless of access disadvantages some social groups may face.

Measures used in New Zealand for multi-modal assessment of inclusive access include public transport service coverage (eg, population living within walking distance of public transport stops served by various levels of service), access to jobs, access to the natural environment, perceptions of public transport, mode share, and physical accessibility of public transport vehicles and facilities.

We recommend the following measures:

- 8.5.1 Public transport network coverage (population): percentage of population living within 400m and 800m of a public transport stop via footpath network
- 8.5.2 Public transport network coverage (jobs): percentage of jobs within 400m and 800m of a public transport stop via footpath network
- 8.5.3 Public transport network coverage (population and jobs): Percentage of population and jobs (combined) within 400m and 800m of a public transport stop via footpath network
- 8.5.4 Public transport activity centre access: percentage of population within 30 min and 45 min door-to-door public transport travel time (AM peak) to an activity centre
- 8.5.5 Public transport access to destinations: community perception.

The first three measures are indicators of the spatial coverage of public transport services. These measures are reasonably straightforward to calculate using geographic information system (GIS) tools, although there is extensive variation in current New Zealand practice as to how coverage measures are defined (eg, relevant distance bands to public transport stops, whether distance is calculated as 'crow flies' or footpath network distance). We recommend a national tool is established to enable consistent calculation of these measures across PTAs. There will be value in reporting on coverage by different service levels (eg, frequent vs coverage services).

The fourth measure is an access measure, similar to the access measures recommended for the economic prosperity outcome, but measuring access to activity centres rather than jobs. Access to an activity centre is a proxy for access to essential social and economic opportunities. Defining this measure requires further definition of what constitutes an activity centre.

The final two measures are measures of customer perceptions of the public transport system. We consider value in customer perception measures of the overall level of access that public transport provides in supplementing the measures of coverage and access. Other measures that may be relevant to this category include the vehicle and facility physical accessibility measures included in the 'fleet' and 'infrastructure' categories of our framework.

# 6 Applying measures and implementing a new measures framework

This chapter discusses how the measures identified for the framework in the previous chapter can be applied in practice. The chapter is organised by the four key purposes for which measures are used to monitor public transport system performance in New Zealand. For each purpose we identify relevant measures, recommended 'headline' measures that we consider are the most important and discuss how implementing the measures framework may require changes to existing practice.

## 6.1 Measures for monitoring public transport operators (purpose A)

### 6.1.1 Relevant measures

In identifying measures relevant to purpose A we focus on those that are useful for PTAs monitoring ongoing operational performance and evaluating how operators are delivering the services they are contracted to provide (eg, monitoring service reliability on a daily, weekly etc basis). Some other measures in the framework may also be useful for benchmarking operators as part of the periodic procurement of public transport operating contracts (eg, measures of vehicle quality in operator's fleets and measures of cost efficiency). These types of measures we cover in purpose B: planning and managing public transport service delivery.

A range of measures can be used for assessing operator's ongoing performance and ensuring adherence to contracts. However, measures in the customer experience category are generally most important. Several measures of customer experience are highly influenced by the way in which an operator delivers its service. These include some measures of service reliability, on-vehicle comfort, and safety and security. Service use and efficiency measures can be used by PTAs to help with benchmarking at a route or unit scale, although these factors are only partially influenced by operator performance.

Table 6.1 provides commentary on the relevance of the eight measure categories for the purpose of monitoring operator performance. Appendix C provides a full list of specific measures in the framework and identifies all that are relevant to purpose A.

**Table 6.1    Relevance of measure categories for monitoring public transport operators (purpose A)**

| Measure category | Subcategories | Relevance for monitoring operators |
|---|---|---|
| 1. Financial | • Revenue<br>• Expenditure<br>• Private share | Some relevance: PTA expenditure on operators is relevant, however, operator cost rates are set through periodic contract negotiations and ongoing monitoring (eg, monthly) is not critical to measuring operator performance. Benchmarking of operator's costs is more relevant to purpose B. |
| 2. Network | • Network structure<br>• Service provision | Not relevant: measures are descriptors of the network and do not provide information about operator performance. |
| 3. Fleet and workforce | • Fleet<br>• Workforce | Relevant: fleet inventory and workforce measures can be used to monitor operators (but fleet requirements usually embedded in contracts). |
| 4. Infrastructure | • Customer facilities<br>  Running way | Not relevant: infrastructure is not within the control of operators. |

| Measure category | Subcategories | Relevance for monitoring operators |
|---|---|---|
| 5. Customer experience | <ul><li>Service frequency</li><li>Travel time</li><li>Reliability</li><li>On-vehicle comfort</li><li>Facilities comfort Customer information</li><li>Safety and security</li><li>Financial cost to customer</li><li>Overall customer experience</li><li>Wider community perceptions</li></ul> | Highly relevant: several customer experience factors are influenced by operator performance including reliability, on-vehicle comfort and safety and security. Variations in some other factors are outside the terms of operator contracts. |
| 6. Service use | <ul><li>Passenger demand End-to-end journey Mode share</li></ul> | Some relevance: passenger demand measures should be reported at route and contract unit scales and operator performance may be a contributor to passenger demand, |
| 7. Efficiency | <ul><li>Service utilisation</li><li>Cost efficiency</li></ul> | Some relevance: cost-efficiency measures should be reported at route and contract unit scales and operator performance may be a contributor to cost efficiency. |
| 8. Transport system outcomes | <ul><li>Healthy and safe people</li><li>Resilience and security</li><li>Economic prosperity, Environmental sustainability</li><li>Inclusive access</li></ul> | Not relevant: measures for monitoring operator delivery of services should generally focus on delivery 'outputs', rather than attempting to measure broader outcomes that their delivery contributes to. |

## 6.1.2   Recommended headline measures

Table 6.2 lists a set of nine measures that we recommend as most important for PTAs in monitoring public transport operator performance on an ongoing basis. Reliability measures are particularly important for monitoring operators, and we include five headline reliability measures, compared with two or three reliability measures that are relevant for other key purposes.

**Table 6.2    Recommended headline measures for monitoring operators**

| Measure category | Subcategory | Measure ID | Measures | Reporting frequency |
|---|---|---|---|---|
| 3. Fleet and workforce | Workforce | 3.2.1 | Workforce: actual as percentage of target | Monthly |
| 5. Customer experience | Reliability | 5.3.1 | Operated (or cancelled) trips | Monthly |
| | | 5.3.3 | On-time departure | Monthly |
| | | 5.3.5 | On-time departure and arrival | Monthly |
| | | 5.3.6 | Headway regularity | Monthly |
| | | 5.3.7 | On-time satisfaction | Annual |

| Measure category | Subcategory | Measure ID | Measures | Reporting frequency |
|---|---|---|---|---|
| | Comfort | 5.4.2 | Vehicle comfort satisfaction | Annual |
| | Safety and security | 5.7.3 | Safety and security satisfaction | Annual |
| | Overall experience | 5.9.1 | Overall trip satisfaction | Annual |
| | | 5.9.4 | Number of complaints | Monthly |

### 6.1.3    Implementing the measurement framework

Our framework identifies a range of measures that PTAs can use to support their monitoring of operators. Implementing this framework could involve:

- changes to NZTA's minimum requirements for inclusion of monitoring measures within PTAs partnering contracts with operators to be more consistent with the identified headline measures in this framework
- PTAs consistently using the same set of headline measures for monitoring all operators.

Section 3.4.1 includes description of NZTA's current requirements for monitoring measures in partnering contracts, as outlined in its procurement manual. Changing these requirements to align with the headline measures identified in this report would involve:

- changing existing service trip reliability, cancellation and punctuality measures to a refined set of measures, all under the heading of 'reliability', and that are consistently used across all four key purposes for public transport measurement and by all organisations in the New Zealand public transport sector
- refining reporting of customer satisfaction measures to only elements of customer satisfaction that are meaningfully influenced by operator behaviour.

## 6.2    Measures for planning and managing public transport system delivery (purpose B)

### 6.2.1    Relevant measures

Monitoring public transport system delivery is distinct from monitoring operators in that a broader range of performance factors are considered than those concerned with ensuring operators' contractual obligations are met. Monitoring system delivery can potentially involve a wide range of measures of service delivered and operations of supporting infrastructure. Measures can be reported at detailed scales, such as at the stop, corridor and route level and disaggregated by various factors (for example passenger demand by customer segmentation). We focus on identifying measures for monitoring system delivery that are also relevant to the other key measurement purposes in our framework (eg, for regional and national transport system oversight). This enables a consistent set of measures that can be 'carried through' to higher-level system oversight and in some cases aggregated to the national level.

Table 6.3 provides commentary on the relevance of the eight measure categories for purpose B: planning and managing system delivery. Measures for this category focus on operational performance rather than assets and system structure. This means that most categories are relevant other than the network and infrastructure categories. The network category involves measures of system provision (eg, quantity of scheduled services) that generally do not change frequently (so are best monitored as part of PTAs' more

strategic system-level monitoring), while the infrastructure category also involves measures of physical public transport facility and running-way assets that would only change on an infrequent basis.

**Table 6.3    Relevance of measure categories for planning and managing public transport system delivery**

| Measure category | Subcategories | Relevance for planning and managing public transport system delivery |
|---|---|---|
| 1. Financial | • Revenue<br>• Expenditure<br>• Private share | Relevant: financial performance is an integral aspect of system delivery. |
| 2. Network | • Network structure Service provision | Not relevant: measures are descriptors of the network, rather than of system delivery. Performance against these measures does not change frequently (ie, generally only changes with service schedule changes) and is more relevant to purposes C and D. |
| 3. Fleet and workforce | • Fleet<br>• Workforce | Relevant: measures of fleet inventory are generally not relevant, but workforce measures can change at high frequency and regular monitoring is important for avoiding problems such as lack of workforce availability. |
| 4. Infrastructure | • Customer facilities Running way | Not relevant: measures are descriptors of physical infrastructure features that do no change frequently. Measures of the operational performance of infrastructure are relevant but are included within the 'customer experience' category. |
| 5. Customer experience | • Service frequency Travel time<br>• Reliability<br>• On-vehicle comfort<br>• Facilities comfort<br>• Customer information<br>• Safety and security<br>• Financial cost to customer<br>• Overall customer experience<br>• Wider community perceptions | Highly relevant: regular tracking of changes to indicators of customer experience is important for identifying emerging issues. These measures can show variation on a frequent basis (ie, daily, weekly monthly). |
| 6. Service use | • Passenger demand<br>• End-to-end journey<br>• Mode share | Highly relevant: level of passenger use is a key indicator of the success of public transport operations and regular tracking is fundamental to understanding performance. Measures of end-to-end journey (access and egress modes) and mode share are more relevant to purposes C and D. |
| 7. Efficiency | • Service utilisation<br>• Cost efficiency | Highly relevant: regular tracking of utilisation and cost efficiency can help identify issues and inform short-term service planning. |
| 8. Transport system outcomes | • Healthy and safe people<br>• Resilience and security<br>• Economic prosperity<br>• Environmental sustainability<br>• Inclusive access | Not relevant: measures for monitoring system delivery generally focus on delivery 'outputs' rather than attempting to measure broader outcomes that their delivery contributes to. Measuring outcomes is more relevant to purposes C and D. |

## 6.2.2  Recommended headline measures

Table 6.4 lists a set of 19 measures that we recommend as most important for regular monitoring of system delivery. These reflect key factors that need to be monitored on at least a quarterly basis (and possibly as frequently as daily) and generally reported on to a broader audience on a monthly basis.

We recommend all nine financial measures are used as headline measures for planning and managing system delivery. The key workforce measure we recommend is 'actual as percentage of target' to help identify workforce shortages. We recommend several reliability measures (although not all the indicators used for operator monitoring) and tracking overall customer satisfaction and a complaints register. We recommend two efficiency measures are regularly tracked: these are a utilisation measure that compares passenger kilometres travelled with capacity provided, and a cost-efficiency measure that standardises operating costs between vehicles and modes to a unit of 'capacity kilometres'.

**Table 6.4**    **Recommended headline measures for planning and managing system delivery**

| Measure category | Subcategory | Measure ID | Measure | Reporting frequency |
|---|---|---|---|---|
| 1. Financial | Revenue | 1.1.1 | Fees and charges revenue (eg, fares) | Monthly |
| | | 1.1.2 | Third-party revenue | Monthly |
| | | 1.1.3 | Grants and subsidies | Monthly |
| | | 1.1.4 | General and targeted rates | Monthly |
| | | 1.1.5 | Other income | Monthly |
| | Expenditure | 1.2.1 | Passenger services expenditure | Monthly |
| | | 1.2.2 | Operations and maintenance expenditure | Monthly |
| | | 1.2.3 | Public transport infrastructure improvements expenditure | Monthly |
| | Private share | 1.3.1 | Private share (private revenue as a proportion of operation expenditure) | Monthly |
| 3. Fleet and workforce | Workforce | 3.2.1 | Workforce: actual as percentage of target | Monthly |
| 5. Customer experience | Reliability | 5.3.1 | Operated trips | Monthly |
| | | 5.3.5 | On-time departure and arrival | Monthly |
| | | 5.3.6 | Headway regularity | Monthly |
| | Overall experience | 5.9.1 | Overall trip satisfaction | Annual |
| | | 5.9.4 | Number of complaints | Monthly |
| 6. Service use | Passenger demand | 6.1.1 | Boardings | Monthly |
| | | 6.1.2 | Passenger kilometres | Monthly |

| Measure category | Subcategory | Measure ID | Measure | Reporting frequency |
|---|---|---|---|---|
| 7. Efficiency | Utilisation | 7.1.3 | Passenger kilometres as percentage of capacity kilometres | Monthly |
| | Cost efficiency | 7.2.3 | Operating cost per unit of capacity kilometres | Annual |

### 6.2.3    Implementing the measurement framework

In practice, system delivery measures are reported on in the following key ways:

- PTA internal reporting
- PTA regular reporting to the public and decision-making bodies such as council committees
- PTA monthly reporting to NZTA
- infrastructure provider operational performance reporting.

Many of the measures identified in our framework as relevant to service delivery monitoring match existing measures and data already collected. However, some measures are new. Implementing this measurement framework across the reporting mechanisms listed above could involve the following changes to current practice.

- Revisions to NZTA's monthly reporting requirements of PTAs, including streamlining the number of measures to those in the recommended set of headline measures.
- More consistent use of a core set of headline measures by PTAs for their regular public-facing reporting and reporting to council committees.
- Adoption of a refined set of reliability measures including use of the 'headway regularity' measure that is not in current common use in New Zealand. This is particularly relevant for high-frequency public transport routes and corridors, and provides a measure of reliability more aligned with customer experience.
- More widespread adoption by PTAs of consistent efficiency measures.
- As noted in Section 3.5.2, there is an opportunity with the new national ticketing system and widespread adoption of automatic vehicle tracking to automate and centralise collation of some of these measures including reliability and passenger boardings and kilometres measures.
- While the focus of this research is on establishing a set of measures for increased 'vertical integration' and consistency of measures across different measurement purposes and organisations involved, PTAs will continue to use additional measures beyond any core set of indicators that may be mandated at a national level. There are a wide range of measure relevant to ongoing monitoring of system delivery.

## 6.3    Measures for national and regional transport system oversight (purposes C and D)

### 6.3.1    Relevant measures

Alongside the PTAs' roles in monitoring operators and day-to-day system delivery, they also have a role in assessing the degree to which their public transport systems are meeting strategic objectives, contributing to high-level transport outcomes and in undertaking strategic planning for their networks. For these regional oversight purposes, some key measures of system delivery are also relevant, but a wider range of network

structure and infrastructure measures are also important. Typical reporting of measures for these purposes occurs on a less frequent basis than for operator and service delivery monitoring. For example, monitoring of achievement of RPTP or statement of intent objectives may occur through annual reports. This means that some system delivery measures may be aggregated to annual averages (eg, annual average service reliability measures) for purposes C and D.

NZTA also plays a role in strategic-level oversight of the sector at a national level, collating data and measures from PTAs to enable aggregation of measures at a national level and for inter-regional benchmarking. NZTA's role in sector measurement contributes to maintaining accountability for public investment in the sector and information investment planning. NZTA reports on measures of public transport performance through mechanisms such as its statement of intent and statement of performance expectations and through dashboards of transport sector indicators.

We consider that a similar range of measures are relevant to both PTA and NZTA transport system oversight roles, at the regional and national levels respectively. Table 6.5 provides commentary on the relevance of measures categories for these purposes. All categories are relevant, and at the system level (as opposed to the operator and service delivery level), the network, infrastructure and outcomes categories all become relevant.

Table 6.5    Relevance of measures for regional and national public transport system oversight

| Measure category | Subcategories | Relevance for regional and national public transport system oversight |
|---|---|---|
| 1. Financial | • Revenue<br>• Expenditure<br>• Private share | Highly relevant: financial reporting is integral to oversight. For oversight, financial performance is most appropriately measured on an annual basis and can be used to track changes over time and for inter-regional benchmarking. |
| 2. Network | • Network structure<br>• Service provision | Highly relevant: measuring characteristics of the network is most relevant as part of strategic-level monitoring of system provision including tracking changes over time and for inter-regional benchmarking. It can inform medium- to long-term system planning. |
| 3. Fleet and workforce | • Fleet<br>• Workforce | Relevant: fleet measures are most appropriately reviewed on an annual basis to inform medium- to long-term planning. Workforce measures are more relevant for monitoring system delivery (purpose B). |
| 4. Infrastructure | • Customer facilities<br>• Running way | Relevant: measures of physical infrastructure provision can inform infrastructure planning. Operational performance of infrastructure covered under 'customer experience' category. |
| 5. Customer experience | • Service frequency<br>• Travel time<br>• Reliability<br>• On-vehicle comfort<br>• Facilities comfort<br>• Customer information<br>• Safety and security<br>• Financial cost to customer<br>• Overall customer experience<br>• Wider community perceptions | Highly relevant: customer experience measures are important contributors to key strategic outcomes from public transport can be reported on an annual basis by averaging measures taken at more regular intervals. They are important indicators to inform planning. |

| Measure category | Subcategories | Relevance for regional and national public transport system oversight |
|---|---|---|
| 6. Service use | • Passenger demand<br>• End-to-end journey<br>• Mode share | Highly relevant: annual tracking of passenger demand provides important indicators of overall system effectiveness. Public transport mode share can be reviewed and reported on periodically (eg, every 5 years to match Census data availability) to inform long-term planning. |
| 7. Efficiency | • Service utilisation<br>• Cost efficiency | Highly relevant: efficiency measures are integral to the oversight function can be reported on an annual basis by averaging measures taken at more regular intervals. |
| 8. Transport system outcomes | • Healthy and safe people<br>• Resilience and security<br>• Economic prosperity<br>• Environmental sustainability<br>• Inclusive access | Highly relevant: measuring public transport system contributions to broader transport outcomes is most relevant at the regional and national scale on a periodic basis. |

## 6.3.2 Recommended headline measures

Table 6.6 lists a set of 22 measures that we recommend as most important for PTA and NZTA regional and national transport system oversight functions. Approximately 80% of these measures are the same as those used for purposes A or B of the framework, and often involve reporting on annual averages for measures that are collected more frequently for purposes A and B. Measures from all categories in the framework are included except the fleet and workforce category. We considered inclusion of headline measures from this category but concluded that these measures are not the most critical headline measures for system-level oversight.

Table 6.6    Recommended headline measures for regional and national transport system oversight

| Measure category | Subcategory | Measure ID | Measures | Reporting Frequency |
|---|---|---|---|---|
| 1. Financial | Revenue | 1.1.1 | Fees and charges (eg, fares) | Annual |
|  |  | 1.1.2 | Third-party revenue | Annual |
|  |  | 1.1.3 | Grants and subsidies | Annual |
|  |  | 1.1.4 | General and targeted rates | Annual |
|  |  | 1.1.5 | Other income | Annual |
|  | Expenditure | 1.2.1 | Passenger services expenditure | Annual |
|  |  | 1.2.2 | Operations and maintenance expenditure | Annual |
|  |  | 1.2.3 | Public transport infrastructure improvements expenditure | Annual |
|  | Private share | 1.3.1 | Private share (private revenue as a proportion of operation expenditure) | Annual |
| 2. Network | Service provision | 2.2.1 | Scheduled capacity kilometres | Annual |
| 4. Infrastructure | Running way | 4.2.1 | Kilometres bus lane, special vehicle lane or railway line in passenger service | Annual |

| Measure category | Subcategory | Measure ID | Measures | Reporting Frequency |
|---|---|---|---|---|
| 5. Customer experience | Travel time | 5.2.1 | Average operating speed | Annual |
| | Reliability | 5.3.1 | Operated trips | Annual |
| | | 5.3.5 | On-time departure and arrival | Annual |
| | Overall experience | 5.9.1 | Overall trip satisfaction | Annual |
| 6. Service use | Passenger demand | 6.1.1 | Boardings | Annual |
| | | 6.1.2 | Passenger kilometres | Annual |
| | Mode share | 6.2.1 | Mode share | Annual |
| 7. Efficiency | Utilisation | 7.1.3 | Passenger kilometres as percentage of capacity kilometres | Annual |
| | Cost-efficiency | 7.2.3 | Operating cost per unit of capacity kilometres | Annual |
| 8. Transport system outcomes | Economic prosperity | 8.5.2 | Public transport access to jobs | Annual |
| | Inclusive access | 8.5.4 | Public transport access to activity centre | Annual |

### 6.3.3   Implementing the measurement framework

Measures used for system oversight are typically reported on in the following ways:

- annual reporting by PTAs against RPTP key monitoring measures
- reporting by regional councils against regional land transport plan monitoring measures
- reporting against measures included in statements of intent, for organisations required to publish including Auckland Transport and NZTA
- dashboards publishing key measures, such as NZTA's funding and transport dashboard (NZ Transport Agency Waka Kotahi, 2025b)
- internal reporting within NZTA or within PTAs on public transport data to inform policy and investment decisions
- NZTA collation of monthly and annual reporting data provided by PTAs.

Implementing the measurement framework proposed by this report could involve the following changes to existing practice.

- Revising NZTA's RPTP development guidelines to specify a refined set of common measures suggested for inclusion in PTAs' RPTPs and associated monitoring and reporting requirements or guidelines.
- Revising NZTA's annual reporting requirements for PTAs to align with the recommended headline measures for system oversight
- PTAs consistently monitoring performance against key oversight measures (eg, as part of annual reporting against their RPTPs)
- Strengthening NZTA guidance or requirements for PTAs to adopt common financial reporting procedures, building on the recent work undertaken as part of the discussion paper on increasing private share (NZ Transport Agency Waka Kotahi, 2024c).

- Increasing publication of data and measures collated by NZTA to increase availability of comparative public transport performance information across regions, enabling benchmarking by PTAs and other organisations and sharing of best practice.

- NZTA establishing centralised analytical tools for calculating measures including network coverage and public transport access (eg, access to jobs or activity centres). This would result in consistent calculation of these measures across regions enabling benchmarking. It would also reduce resources spent by PTAs on data analysis and purchase of tools to conduct analysis.

- NZTA strengthening practices for data collection from PTAs to streamline processes and maximise use of centralised data available through the national ticketing system.

- Using measures and measure definitions more consistently across different levels of oversight (ie, increased vertical integration).

## 6.4 Summary of headline measures

Table 6.7 summarises the headline measures for each of the four key purposes as discussed in the previous subsections. It highlights the extent of 'vertical integration' or consistency of headline measures across these different purposes. In total, we identify 30 headline measures.

Three of these measures are proposed for consistent use across all four purposes:

- reliability – 5.3.1 Operated trips
- reliability – 5.3.5 On-time departure and arrival
- overall experience – 5.9.1 Overall trip satisfaction

Four measures, plus all nine financial measures are proposed for consistent use across three purposes (purposes B, C and D, but are not relevant for purpose A: monitoring operators):

- passenger demand – 6.1.1 Boardings
- passenger demand – 6.1.2 Passenger kilometres
- utilisation – 7.1.3 Passenger kilometres as percentage of capacity kilometres
- cost-efficiency – 7.2.3 Operating cost per unit of capacity kilometres.

**Table 6.7     Headline measures by key purpose**

| Measure category | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
|---|---|---|---|---|
| 1. Financial | | Comprehensive financial reporting, private share (measures 1.1.1 to 1.3.1) | | |
| 2. Network | | | Service provision: 2.2.1 Scheduled capacity kilometres | |
| 3. Fleet and workforce | Workforce: 3.2.1 Workforce: actual as percentage of target | | | |
| 4. Infrastructure | | | Running way: 4.2.1 Kilometres of bus lane, special vehicle lane or railway line in passenger service | |
| 5. Customer experience | | Travel time: 5.2.1 Operating speed | | |
| | Reliability: 5.3.1 Operated trips; 5.3.5 On-time departure and arrival | | | |

| Measure category | A. Monitoring public transport operators | B. Planning and managing public transport system delivery | C. Providing regional oversight of the transport system | D. Providing national oversight of the transport system |
|---|---|---|---|---|
| | Reliability: 5.3.6 Headway regularity | | | |
| | Reliability: 5.3.3 On-time departure; 5.3.7 On-time satisfaction | | | |
| | Comfort: 5.4.2 Vehicle comfort satisfaction | | | |
| | | Comfort: 5.5.1 Stops, stations and terminals quality satisfaction | | |
| | Safety and security: 5.7.3 Safety and security satisfaction | | | |
| | Overall experience: 5.9.1 Overall trip satisfaction | | | |
| | Overall experience: 5.9.4 Number of complaints | | | |
| 6. Service use | | Passenger demand: 6.1.1 Boardings, 6.1.2 Passenger kilometres | | |
| | | | Mode share: 6.2.1 Public transport mode share | |
| 7. Efficiency | | Utilisation: 7.1.3 Passenger kilometres as percentage of capacity kilometres | | |
| | | Cost-efficiency: 7.2.3 Operating cost per unit of capacity kilometres | | |
| 8. Transport system outcomes | | | Economic prosperity: 8.5.2 Public transport access to jobs | |
| | | | Inclusive access: 8.5.4 Public transport access to activity centre | |

## 6.5    Data sources for measures

A key consideration in the feasibility of implementing a performance measurement framework is availability of data and extent of analytical effort required to calculate measures. Our overall framework identifies 79 measures (30 of which we identify as headline measures).

In selecting measures for inclusion in the framework we considered data availability and analytical effort, and prioritised measures for which data is readily available (or better still, measures that are well established in the sector). Nevertheless, our framework does propose new measures that are not well-established in the sector, some of which require collection of new data or analysis that combines various datasets. The list of measures is provided in Appendix C.

The following are the main data sources for measures in the framework.

- PTA records: data that PTAs should be able to collate from internally available information or from operators or partner local authorities, such as inventories of fleet, infrastructure, data on public transport routes and schedules, and financial records.
- Customer and community surveys: data from customer surveys, such as that mandated by the NZTA procurement framework, and surveys of the broader community, such as NZTA's journey experience monitor.

- Ticketing: data from ticketing systems that can be analysed to calculate measures such as boardings and passenger kilometres travelled.
- GPS vehicle tracking: data from telematics systems that are routinely fitted to public transport vehicles that can allow for calculation of some reliability measures.
- Existing government sources: data from sources such as the Census and NZTA's crash analysis system.

Table 6.8 summarises the data sources for each category of measures in the framework. It shows that:

- measures in the 'input' categories 1 to 4 generally rely on PTA records to inform measures of financial reporting, fleet and infrastructure inventory, workforce and route and timetable information
- the customer experience category of measures is extensive and relies on a broad range of data sources, although 15 of the 29 measures use data that can be potentially sourced from a single customer satisfaction survey, while an additional seven can be sourced from vehicle tracking data
- ticketing data is a key source for service use (passenger demand) measures
- all five efficiency measures are calculated by combining data from other measures in the framework (eg, boardings and operating cost measures)
- transport outcome measures are generally the most complex measures to calculate, and many rely on analysis that combines multiple data (eg, GIS analysis of multiple spatial datasets to calculate public transport access or network coverage). There are opportunities for centralisation of analytic tools and data to address this complexity (eg, nationally consistent approaches to measuring public transport access).

**Table 6.8**   Number of measures in framework by data source

| Measure category | Data source | | | | | | | | Total measures |
|---|---|---|---|---|---|---|---|---|---|
| | PTA records (including operator data) | Customer surveys | Community surveys | GPS vehicle tracking | Ticketing (via operator, PTA or national ticketing system) | Existing government data (eg, Census, crash analysis system) | Other | Derived from other measures in framework | |
| 1. Financial | 8 | | | | | | | 1 | **9** |
| 2. Network | 6 | | | | | | | | **6** |
| 3. Fleet and workforce | 10 | | | | | | | | **10** |
| 4. Infrastructure | 3 | | | | | | | | **3** |
| 5. Customer experience | 2 | 15 | 1 | 7 | 1 | 1 | | 2 | **29** |
| 6. Service use | | 1 | 1 | | 2 | 2 | | | **6** |
| 7. Efficiency | | | | | | | | 6 | **6** |
| 8. Transport system outcomes | | | 1 | | | | 9 | 3 (repeated from other measures in framework) | **10** |
| **Total measures** | **29** | **15** | **3** | **7** | **3** | **3** | **9** | **9** | **79** |

# 7    Conclusion

We have proposed a new framework for public transport measurement in New Zealand. The framework aims to establish a comprehensive approach to performance measurement and support increased consistency in the use of measures across the sector. It also involves increased consistency in the use of measures for various purposes, from monitoring operator contracts on a day-to-day basis through to using measures to understand the contribution of public transport to strategic policy objectives.

The framework has been informed by our review of international literature on comprehensive public transport performance measurement approaches, and by our review of international practice based on a set of case study agencies that measure public transport system performance. It has also been informed by our review of current New Zealand measurement practices and policies, including identification of opportunities for enhancing existing practice based on findings from the engagement with PTAs, operator representatives, KiwiRail, NZTA and the Ministry of Transport, which occurred throughout the research process.

Our proposed new framework includes two key components: an organising logic for measures and a suite of specific measures that populate the framework. We experimented with multiple organising logics and recommend a structure organised by two factors: a set of measure categories and a set of key purposes for which measures are used. The eight measure categories and 29 subcategories communicate the breadth of elements that contribute to public transport performance and differentiate between measures of inputs, system delivery outputs and high-level outcomes. The four purposes enable identification of relevant measures for distinct functions for which measures are used by the New Zealand public transport sector. They also communicate how measures can be consistently applied across these purposes and the organisations responsible for these functions.

The 79 measures that populate the framework cover the main elements that contribute to public transport performance, with performance considered from the perspectives of public transport customers, operators, agencies, funders and policy-makers. The recommended measures have been identified through the literature and practice review, and build on existing New Zealand practice. While there are a much wider range of potential measures than those proposed, the measures selected have been chosen as they are intuitively understandable by a broad audience, are feasible to collect, reflect important elements of system performance and are relevant to the New Zealand context.

A subset of 30 measures are identified as core 'headline' measures, which are the most important measures that collectively provide a snapshot of overall performance. This number is consistent with the number of headline measures in the international case study examples. Headline measures are identified for each of the four key measurement purposes in the framework, and, as much as possible, are kept consistent across the purposes for which they are relevant.

While we have identified a coherent and logical measurement framework, there are multiple ways in which a framework could be organised and an even wider range of specific measures that could populate our measure categories. The research is intended to inform development of improved measurement practices by the New Zealand public transport sector, and any framework that might be implemented by the sector could entail further evolution of what is recommended. We expect that any such process would involve further collaboration and engagement among key sector actors, including operators, PTAs and relevant government agencies.

There are several areas that we consider worthy of further investigation and exploration by the sector. With regards to the organising logic of the framework, there are challenges distinguishing between separate measures of inputs, outputs and outcomes. While we consider this framing to have value, there are potential

shortcomings. For example, the operational performance of infrastructure is assessed through the customer experience category, while the infrastructure itself is assessed as an input.

There are multiple potential organising devices and categorisations that could be used. For example, some of the international literature highlights the distinction between measures of efficiency, effectiveness and equity as being important, and there may be potential for alternative organising devices to highlight this distinction further. Our proposed framework clearly identifies measures of efficiency with its own category. Measures of effectiveness are presented less obviously, but are included as various measures within the delivery and outcome categories. Measures of equity are challenging, and the way in which our framework addresses this is to identify that certain measures should be disaggregated by social grouping (eg, measures of customer satisfaction disaggregated by age and gender, or measures of access disaggregated by various levels of socio-economic deprivation) to understand how performance differs across different social groups.

There are also challenges in the framing of the four key purposes that organise the framework. In practice, there is considerable overlap across these four functions. For example, there is not a neat distinction between PTAs' roles in monitoring system delivery and their more strategic-level oversight of the regional system.

Establishing an organising logic that can be enduring to shifting political, social and technological contexts is also challenging. We have attempted to be comprehensive and include space for a full range of potential measures relevant to public transport performance monitoring. Nevertheless, measurement frameworks are tools for understanding what is important to the organisations undertaking measurement, and priorities for measurement will no doubt shift with changing contexts. This report documents the process used to establish an organising logic, so that future amendments can be more readily made in response to changing contexts.

With regards to the specific measures that we recommend for populating the framework, we have taken care to select measures that perform well against our assessment criteria. We have tended to prioritise measures that are already well-established in existing New Zealand practice, unless there are good reasons to depart from existing practice. This reflects the challenges of introducing new measures, such as collection of new data, new analytical effort and buy-in from the sector. That said, we do recommend several new or modified measures that we consider will have value for the sector. For example, recommended new measures include:

- measures of network structure and service provision; these address a gap in current practice for descriptors of the levels of public transport service provided and will help inter-regional benchmarking
- expanded measures of workforce, building on work currently underway with NZTA and addressing the importance of workforce in ensuring that service is delivered
- measures of public transport operating speed, reflecting that travel time (which operating speed influences) is an important contributor to customer experience and that problems with operating speed can signal the need for infrastructure improvements
- measures of reliability that clarify definitions and introduce a new measure of 'headway regularity' to address deficiencies in current measures for measuring the customer experience of reliability for more frequent services
- measures of efficiency, seeking more consistency across the sector and introducing new measures that allow for cross-modal comparison by taking account of different passenger capacities of vehicles and modes
- measures of public transport access and service coverage, with clearer definitions that ensure increased consistency and allow for inter-regional benchmarking.

These new measures supplement many measures that are in common existing use, including measures from customer and community surveys, measures of patronage and passenger kilometres, and some measures of service reliability.

The concept of 'vertical integration' or increased consistency in the use of measures across the sector is a key objective of this research. Achieving increased consistency will require careful implementation of any new measurement framework across a decentralised sector and there are several methods to supporting increased consistency. One approach is for more central guidance on measurement from government agencies, particularly NZTA. NZTA is already taking a more active role in providing guidance to the sector and this could continue, potentially including the mandating of measurement requirements by PTAs and other relevant organisations.

A range of tools is now available to simplify the measurement process, and the use of centralised data processing to automate measurement would minimise the burden on PTAs and ensure that measures are calculated in a consistent way across the country. For example, the imminent introduction of the national ticketing system provides a clear opportunity for increased central collation of data related to public transport service use, which could allow some measures, such as boardings and passenger kilometres, to be centrally calculated and disseminated. Centrally managed tools could also be developed to calculate more complex measures, such as those that rely on GIS analysis like service coverage and public transport access. Close engagement with the sector would be required in establishing centralised tools to manage risks associated with the local relevance of data and tools. PTAs would also need to retain full access to centrally held data collected from their region, to use for their own purposes and analyses.

Increased consistency would also be supported by training and knowledge-sharing across the sector, which would help communicate the value of enhanced measurement processes and assist in managing analytic and data collection effort. Any effective framework will require buy-in from multiple organisations and depends on 'bottom-up' adherence to consistent measurement practices as well as 'top-down' coordination. This highlights the importance of extensive engagement with the sector to test new measurement practices and draw on sector knowledge ahead of introducing a new framework.

We are aware that the proposed measurement framework may be perceived as introducing onerous and unrealistic data collection and analytic requirements on the sector. In response, however, we note that the research is intended to provide a comprehensive approach to measurement and indicate best practice. The extent to which the framework is implemented by the sector and individual measures become requirements is beyond the scope of this research. At the same time, in selecting a suite of measures we have aimed to identify measures that are feasible to collect and limit the range of measures and data sources required.

While the list of measures appears extensive, most can be derived from a reasonably small number of data sources (see Section 6.5), for example customer and community surveys (already established in existing practice), ticketing data, and GPS vehicle tracking data that is increasingly available. Several of the measures do rely on comprehensive data collection and record keeping by PTAs, operators and infrastructure providers, and some of the more complex measures involve combination of multiple data sources and analytic tools, such as GIS. Ultimately, the acceptability of effort required to undertake measurement of performance will rely on demonstration that measures meaningfully contribute to sector decision-making, optimise performance, and lead to better outcomes for public transport customers, agencies, funders and the broader community.

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# Appendix A: Engagement with public transport authorities and operators

We held a series of meetings with representatives from PTAs and operators. The aim of this engagement was as follows.

A) To inform our understanding of current practice including:

    a.   current use of public transport measures by PTAs for various purposes (eg, for operator contract monitoring and outcomes monitoring through inclusion and reporting on RPTPs)

    b.   the extent to which measures are 'vertically integrated' (ie, the degree of consistency between measures used across different purposes and different levels of oversight)

    c.   the rationale for PTAs selecting specific measures for different purposes

    d.   operator views on current measurement practices.

B) To inform our identification of strengths and weaknesses of current practice and opportunities for enhancement including:

    a.   PTAs' plans for use of potential new measures in the future

    b.   PTA and operator views on the constraints and opportunities for enhancing public transport measures

    c.   impacts of current measures on operator incentives.

The meetings involved the research team presenting briefly on the research project aims and process and initial findings from the research (eg, a desktop review of measures included in PTAs' RPTPs), and then asking questions and seeking feedback on the topics above. The meetings ranged from 30 to 90 minutes in length, and were held online via Microsoft Teams. In some cases the research team communicated with meeting participants after the meetings to share additional information.

# Appendix B:   Case studies of international practice

## B.1   Transport for London

### B.1.1   Overview

Transport for London is the local government body responsible for managing key elements of the transport network in London, in the United Kingdom. It oversees a wide range of public transport services and road infrastructure including the London Underground, buses, tram and light rail, roads and cycling, and rail services.

### B.1.2   Performance measures

Network performance statistics and customer feedback are published on Transport for London's website including annual and quarterly network performance summaries, long-term performance graphs, and survey results.

As an example, Transport for London's bus network performance statistics and customer feedback is collected and reported to understand how bus services are operating and what can be done to improve them. All bus performance measures are published on a quarterly and annual basis on the agency's website.

A range of performance measures are used to understand how Transport for London's services are operating and what can be done to improve them, as shown in Table B.1     (Transport for London, 2025a). In broad terms, these include measures of bus operations, customer-oriented measures of the impacts of bus reliability (distinguished by frequency of service) and a series of measures drawn from customer satisfaction surveys.

A summary indicator is determined for each quarter and then compared against that of the same quarter of the previous year. These time periods are compared, as the factors affecting performance, such as traffic conditions, can be variable depending on the time of year. This approach makes it possible to identify underlying trends.

Table B.1     Transport for London performance measures for bus services (adapted from Transport for London, 2025a)

| Category | Measure |
|---|---|
| All buses | Vehicle kms scheduled (million) |
| | % vehicle kms operated |
| | % kms lost for staff reasons |
| | % kms lost for mechanical reasons |
| | % kms lost for traffic reasons |
| | Vehicle kms operated (million) |
| | Bus speeds (mph) |
| High-frequency services | Average scheduled wait (minutes) |
| | Average excess wait (minutes) |
| | Average actual wait (minutes) |
| | % chance of waiting <10 mins |

| Category | Measure |
|---|---|
| | % chance of waiting 10–20 mins |
| | % chance of waiting 20–30 mins |
| | % chance of waiting >30 mins |
| Low-frequency services | % departing on time |
| | % departing early |
| | % departing 5–15 mins late |
| | % non-arrival |
| Customer satisfaction (score out of 100) | Overall customer satisfaction |
| Bus station and/or stop satisfaction | Cleanliness |
| | Information or electronic countdown |
| | State of repair |
| | Crowding |
| | Your personal safety |
| | Wait time for your bus |
| | The ability to social distance |
| | The availability of hand sanitiser (bus station) |
| On bus satisfaction | Cleanliness |
| | Information |
| | Crowding |
| | Comfort |
| | Temperature |
| | State of repair |
| | Availability of seats |
| | The ability to social distance |
| | Journey time (not including waiting) |
| | Your personal safety |
| | Smoothness of journey |
| | Ease of getting on and off |
| | Approachability and helpfulness of the driver |
| | Delays |
| | Valued as a customer |
| | In control of your journey |
| | First bus |

### B.1.3 Benchmarking

London is part of the International Bus Benchmarking Group an international knowledge sharing network of medium and large bus service providers (International Bus Benchmarking Group, 2025).[4] A combination of operational and customer metrics are used to track the performance of the bus network and compare the performance of London buses to other world cities. Many of these measures are efficiency ratio-type indicators that allow for comparison across jurisdictions. The measures include:

- $CO_2$ emissions (per passenger km)
- network efficiency (km)
- commercial income (per total operating cost)
- service operation cost (per revenue vehicle hour)
- average planning capacity utilisation
- cost efficiency (per vehicle hour)
- fare revenue and compensation (per passenger km)
- punctuality
- average commercial speed
- lost vehicle km due to internal reasons such as driver shortages
- vehicle collisions (per vehicle km)
- commercial speeds
- customer satisfaction.

# B.2 Mass Transit Railway Corporation

### B.2.1 Overview

Mass Transit Railway Corporation (known as MTR) is a government-owned public transport operator and property developer based in Hong Kong. It operates public transport systems in Hong Kong and several cities globally, including rapid transit systems in London, Stockholm, Beijing, Hangzhou, Macao, Shenzhen and Sydney, and the suburban rail system in Melbourne.

MTR reports against a range of performance measures for the global systems it operates in its 'Investor Information' section on the company website (Mass Transit Railway Corporation, 2025). This section includes access to annual and interim results, monthly returns, announcements and circulars, and the corporate calendar. The company website also provides 10-year statistics, which enable performance changes to be monitored over time.

### B.2.2 Performance measures

As shown in Table B.2 , a broad range of measures are used to monitor MTR's organisational and operational performance. Measures are organised using a sustainability framework.

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[4] The International Bus Benchmarking Group is one of a family of benchmarking groups facilitated by the Transport Strategy Centre. These include North American and international benchmarking groups for the metro, bus, rail and airport sectors. No New Zealand organisations are part of the International Bus Benchmarking Group, which currently includes 16 members from European, North American and Asian cities.

**Table B.2    MTR performance measures (adapted from Mass Transit Railway Corporation, 2025)**

| Category | Subcategory | Example key performance indicator |
|---|---|---|
| Economic value generated and distributed | Total economic value generated | Measures of revenue by source (eg, from operations, commercial business, property) |
| | Total economic value distributed | Measures of expenditure by category (eg, staff costs, taxes, operating costs, capital expenditure) |
| Environmental performance | Energy use | Electricity consumption per revenue car-km |
| | Water consumption | Water consumption from station cooling towers |
| | Waste management | Tonnes metals recycled from railway operations |
| | Climate change management | Completion of annual review of climate change risk assessment |
| | Greenhouse gas emission inventory | Scope 1, 2, 3 greenhouse gas emissions (tonnes $CO_2$e) |
| Social performance | Ridership | Total number of passenger trips |
| | Total workforce | Workforce by age, gender, etc |
| | Voluntary staff turnover | Turnover rate % |
| | Vacant posts filled internally | Vacant posts filled internally % |
| | New employee hires | New hires by age, gender, etc. |
| | Employee training | Training days per employee by gender |
| | Charitable contributions | Total employee volunteer hours |
| | Legal compliance (number of convicted cases) | Number of cases involving health and safety |
| | Supply chain | Number of suppliers by international location |
| Safety targets and performance | Passenger and public safety | Number of injuries requiring hospitalisation per 100 million passenger journeys |
| | Staff safety | Lost time injuries per 100,000 man hours |
| | Contractor safety | Lost time injuries per 100,000 man hours |

## B.2.3    Benchmarking

To benchmark its performance against other world cities, MTR is part of the Community of Metros (COMET) programme (Community of Metros Benchmarking Group, 2025), an international knowledge sharing network of medium and large metro system providers.[5] Performance is measured through six broad categories: growth and learning; customers; internal processes; safety and security; financial performance; and environmental performance.

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[5] COMET is another of the family of benchmarking groups facilitated by the Transport Strategy Centre. No New Zealand organisations are part of COMET, which currently includes 45 metro systems from 42 European, North American and Asian cities.

# B.3　TransLink Metro Vancouver

## B.3.1　Overview

TransLink is the statutory authority responsible for the regional transport network of Vancouver in British Columbia, Canada. It is responsible for major roads, bridges, and public transport (buses, SkyTrain, West Coast Express, SeaBuses and HandyDART).[6]

TransLink publishes a transit service performance review (TransLink, 2023) annually, providing a comprehensive summary of performance trends across all modes of TransLink's public transport system. The historical reports and data included in these reports are available for the years 2011 to 2022. In addition, an online dashboard is available, which displays performance metrics for each mode of public transport.

## B.3.2　Performance measures

The Translink Metro Vancouver's accountability centre (TransLink, 2025) is used to track the performance of the regional transport system and the satisfaction of customers to see how well goals and customer expectations are met. Key performance indicators (KPIs) displayed in the accountability centre are organised under the categories of ridership, customer satisfaction, safety and security, service quality, efficiency and environment (Table B.3).

**Table B.3　TransLink Metro performance measures (adapted from TransLink, 2025)**

| Measure | Metric | Definition |
|---|---|---|
| Ridership | Boardings | Number of annual and monthly boardings. |
| | Journeys | Number of annual and monthly journeys. |
| | HandyDART ridership | Accounts for registered passengers travelling on both HandyDART and taxi services. It excludes escorts and attendants who accompany registered passengers. |
| | HandyDART and taxi ridership | HandyDART trips are the number of trips delivered by HandyDART vehicles. Taxi supplement trips are the number of supplemental taxi trips delivered. Supplemental taxi service is used when regular HandyDART vehicles are not available |
| | Historic ridership trend | Measure of ridership between 2004 and 2023. |
| Customer satisfaction | Customer satisfaction trend | Ratings reflect riders' overall, top-of-mind experience (where 1 is very poor and 10 is excellent) in using the transit system within the past month. This measure is captured annually and monthly. |
| | Customer satisfaction by service type | Quarterly average satisfaction rating (out of 10) by service type. |
| | Customer complaints | Customer complaints received by TransLink. |
| | HandyDART customer complaints | Customer complaints received by TransLink for HandyDART services. Includes complaints on taxi services. |

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[6] SkyTrain is Vancouver's rapid transit system. West Coast Express is the city's commuter rail service. SeaBus provides a passenger ferry service between North Vancouver and Vancouver. HandyDART is an accessible transit service that provides door-to-door service using vans or small buses to transport disabled or elderly passengers who cannot use the normal transit system.

| Measure | Metric | Definition |
|---|---|---|
| Safety and security | Customer injury rate | Number of injuries where the customer on the transit system is transported to hospital for treatment and the incident is reported to transit staff. |
| | Employee injury rate | Rate of injuries that result in days lost from work (per 200,000 hours worked). |
| | Preventable bus collisions | Preventable bus collisions per million service kms (annually and monthly). A preventable collision is where the operator has failed to do everything reasonable to prevent the incident or accident. Reasonable expectations from the operator are to follow the rules and regulations of the road, policies and procedures for the company, trained techniques, and national safety code. |
| | Crime rate against persons | Crime rate represents crimes handled by Transit Police (against persons, both on and off transit property) per 100,000 boardings. |
| | Crime rate against property | Crime rate represents crimes handled by Transit Police (against property, both on and off transit property) per 100,000 boardings. |
| Service quality | Transit service provided | Annual conventional service hours (per capita) for bus, SkyTrain, SeaBus and West Coast Express. It does not include HandyDART services. |
| | Bus service delivered | Percentage of scheduled bus service hours that had a bus actually run. |
| | Service regularity – frequent bus service | Percentage of bus trips arriving between 0% and 120% of scheduled headway (measurement of time between vehicles in a transit system). Includes bus services at 12 minutes or less headway running Monday to Sunday. |
| | On time departure – non-frequent bus service | Percentage of bus trips departing no more than 1 minute early or 3 minutes later than their scheduled departure. Includes bus services at more than 12 minutes headway. |
| | HandyDART on-time performance | Percentage of trips arriving earlier than and within 15 minutes of scheduled pick-up window. |
| | Expo and Millennium line on-time performance | Percentage of trips delivered within 3 minutes of planned frequency. |
| | HandyDART wait time | Percentage of HandyDART vehicles arriving for scheduled pick-up within the following windows:<br>• early – more than 15 minutes prior to scheduled pick-up time<br>• on time – 0 to 15 minutes prior to pick-up time and on-time<br>• on time – 1 to 15 minutes after the scheduled pick-up time<br>• late – more than 15 minutes after the scheduled pick-up time. |
| | West Coast Express on-time performance | Percentage of trips delivered within 5 minutes of planned frequency, excluding cancelled services. |
| | Expo and Millennium line service delays (16–30 minutes and 30+ minutes) | Measures the duration from delay incident happening, until the train service resumes normal operation. It is split by:<br>• controllable events – includes incidents that are caused by internal factors such as vehicle, systems, train operation and snow operation<br>• beyond control events – includes incidents caused by external factors such as safety and security incidents, and medical emergencies. |

| Measure | Metric | Definition |
|---|---|---|
| | Escalator and elevator availability | Percentage of time elevators are in service during operating hours. |
| | Bus stop accessibility | Percentage of bus stops that are wheelchair accessible. |
| | HandyDART trip denials | Proportion of trip requests, where a trip denial is when HandyDART had to tell the customer that they could not provide this trip because capacity was not available. |
| Efficiency | Service productivity | Conventional system boardings per service hour for bus, SkyTrain, SeaBus and West Coast Express. It does not include HandyDART services. |
| | Operational cost recovery | Percentage of operating cost paid for by fare revenue. |
| | Cost per boardings: conventional system | Operating cost per boarding ($/ boarding). |
| | Cost per trip: HandyDART | Operating cost per trip ($/ trip) for both HandyDART and taxi services. |
| Environment | Revenue fleet greenhouse gas emissions | Tonnes of $CO_2$ equivalent emissions emitted from TransLink's revenue fleet (bus, SkyTrain, Canada Line, community and contracted shuttles, HandyDART, SeaBus and West Coast Express) and non-revenue fleet (pool cars, maintenance and security vehicles, and Transit Police vehicles). |
| | Facility energy consumption | Electricity and natural gas used to power and heat TransLink facilities, including the TransLink head office, CMBC, SkyTrain, West Coast Express, SeaBus, West Vancouver Transit Centre and HandyDART. |
| | Criteria air contaminants emissions | Generation of criteria air contaminants (CACs) from its revenue fleet, including buses, HandyDART, community and contracted shuttles, SeaBus and West Coast Express. CACs are a group of air pollutants that cause smog, acid rain and health hazards. They are typically the producers of the combustions of fossil fuels or industrial processes. |

# B.4   Translink Queensland

## B.4.1   Overview

Translink is the public transport agency in the state of Queensland, Australia, and is a division of the Department of Transport and Main Roads. The division is responsible for buses, trains, ferries, trams and demand responsive transport across South East Queensland.

## B.4.2   Performance measures

Translink reports on public transport performance using a range of measures and tools published on its website (Translink Queensland, 2025).

The Translink public transport performance dashboard is a digital resource that is intended for a public audience (Figure B.1). It represents the area from the Sunshine Coast to the Gold Coast, and includes measures such as on-time running, patronage, fines and warnings, passenger injuries, and 25 customer experience metrics. These metrics are reported on the dashboard for each quarter of the year (refer to Table B.3       ).

Regular surveys are conducted to gather feedback from passengers, which helps in assessing and improving service quality. Other performance data is also available, including G:link monthly service statistics, patronage and complaints, as well as go card and ticketing.

**Figure B.1** **Translink public transport performance network reliability dashboard (reprinted from Translink Queensland, 2025)**
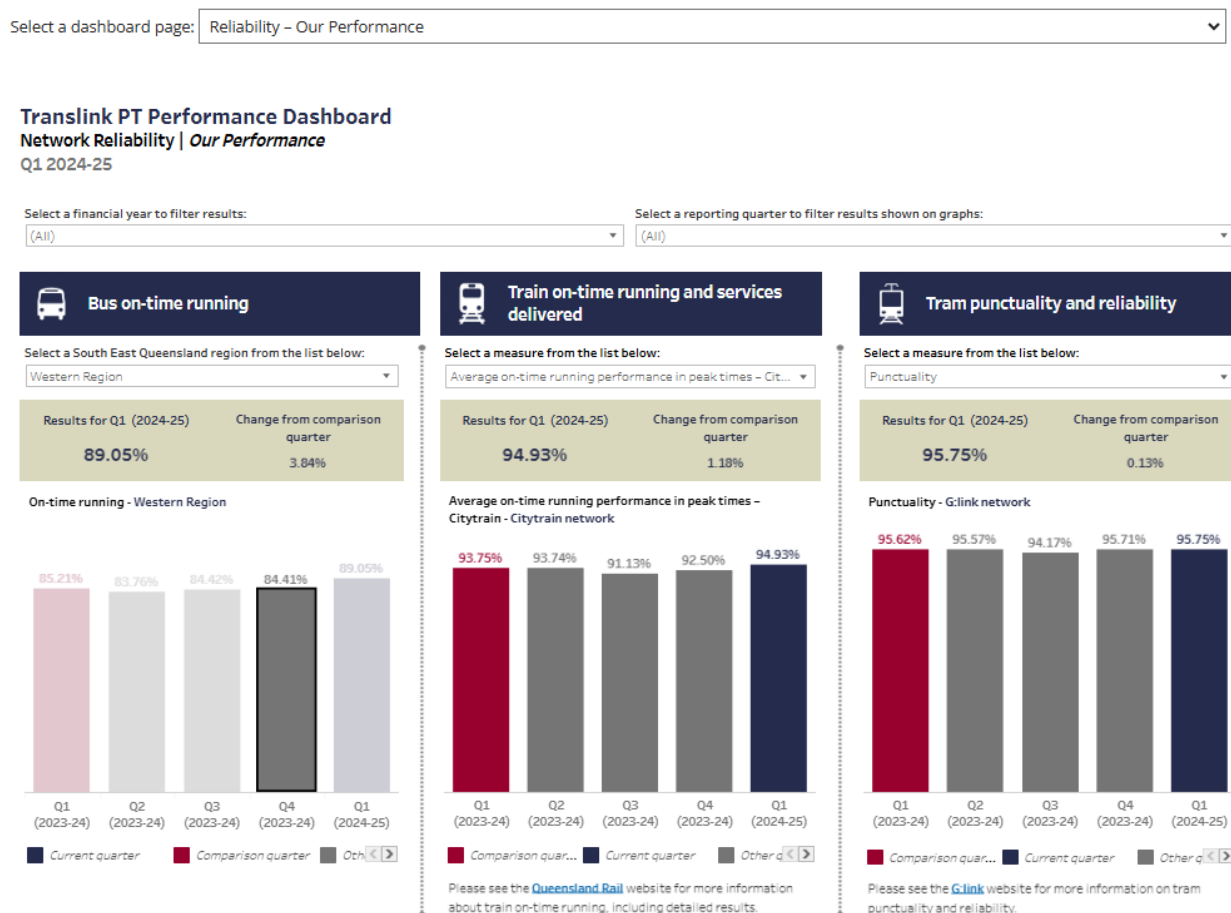


**Table B.3** **Translink Queensland performance measures (adapted from Translink Queensland, 2025)**

| Measure | Metric | Definition |
|---|---|---|
| Reliability | On-time running South East Queensland bus overall | On-time running is measured at selected key locations within specific time periods. The current on-time running calculation is based on an average monthly sample of all urban services across the South East Queensland bus network, consolidating the average performance from early departures, late arrivals and missed connections (as applicable) for a number of routes. |
| | Citytrain 24/7 (adjusted for force majeure) | The percentage of train services on the Citytrain network that arrive at their destination within 3:59 minutes (adjusted for force majeure events). Note: Gold Coast, Rosewood and North Coast services are classified as 'on time' if they arrive at their destination within 5:59 minutes. |

| Measure | Metric | Definition |
|---|---|---|
|  | Average on-time running performance in peak times – Citytrain | The percentage of morning and afternoon peak train services on the Citytrain network that arrive at their destination within 3:59 minutes. Note: Gold Coast, Rosewood and North Coast morning and afternoon peak services are classified as 'on time' if they arrive at their destination within 5:59 minutes. All afternoon peak (3:30–6:30pm) services are measured on arrival at their destination; while most morning peak (6–9am) services are measured on arrival at Central Station. |
|  | Scheduled services delivered – Citytrain | The number of services delivered expressed as a percentage of the total services scheduled, adjusted for force majeure events. |
|  | Punctuality – tram | Punctuality is the percentage of services that arrive and depart on time when compared with the contract timetable. Punctuality is only measured at key stations. |
|  | Reliability – tram | Reliability is the number of fully completed services and partially completed services compared with scheduled services of the light rail contract timetable. |
| Patronage | Patronage (disaggregated by mode) | A single one-way movement of a person from an origin to a destination. |
| Safety | Passenger fines | All fines issued across the South East Queensland network. Note: all historical data is subject to change due to delays in fines being logged. |
|  | Passenger injuries (disaggregated by mode) | Passenger injuries: any injury (regardless of severity) that is obtained while on the bus, train, tram or platforms. |
|  | Passenger warnings | All warning notices issued across the South East Queensland network. Note: all historical data is subject to change due to delays in warnings being received and entered. |

| Measure | Metric | Definition |
|---------|--------|------------|
| Customer experience | • Frequency of services<br>• Punctuality<br>• Accessibility of the station, stop or terminal<br>• Accessibility of the vehicle<br>• Availability of information needed to complete your trip<br>• Availability of information to commence trip<br>• Availability of information to plan a trip<br>• Availability of seating<br>• Cleanliness at the station, stop or terminal<br>• Cleanliness on board<br>• Comfort of the ride<br>• Comfort on board<br>• Convenience of station, stop or terminal to starting location<br>• Cost of the trip<br>• Design of facilities at station, stop or terminal<br>• Ease of transferring between services<br>• Ease of using the service overall<br>• Experience on last trip<br>• Feeling safe at stop, station or terminal<br>• Feeling safe on board<br>• Helpfulness of staff members<br>• Journey time<br>• Overall experience on the network<br>• The ease of transferring on your last journey | Measure of customers' experience and satisfaction with passenger transport services in Queensland |
|  | Customer service complaints in South East Queensland per 10,000 trips | This measure allows the department to assess the effectiveness of specific elements of the public transport system, and the range of strategies implemented to attract passengers and increase the number of trips made on public transport. |

## B.4.3   Benchmarking

Translink primarily focuses on benchmarking its performance within the state and against its own historical data. There is no indication that Translink benchmarks its performance against other countries.

# B.5    Transport for New South Wales

## B.5.1    Overview

Transport for New South Wales is a New South Wales (NSW) government transport services and roads agency, responsible for directly managing most train, bus, ferry and light rail services in NSW. It also manages the route design, timetabling and branding of these services, and provides passenger information via printed material, a telephone service and a website.

## B.5.2    Performance measures

On the Transport for New South Wales website, the 'Data and Insights' section provides information on how the agency measures and reports on public transport performance (Transport for New South Wales, 2025). Performance data is updated on a monthly basis and made available to the public through interactive dashboards and reports. The performance measures are shown in Table B.4 .

Table B.4    Transport for New South Wales performance measures (adapted from Transport for New South Wales, 2025)

| Report | Mode | Measure | Measure description |
|---|---|---|---|
| Bus performance reports | Sydney buses | Performance – on-time running | % of timetabled services that were on time at the first transit stop of a trip |
| | | Reliability – service cancellations | % of timetabled services that were cancelled at the first transit stop of a trip |
| | | Customer experience – customer complaints | Number of complaints per 100,000 passenger trips |
| | | Customer information – real-time service tracking | % of timetabled services that were not tracked in real time at the first transit stop of a trip |
| | | Bus driver vacancies | Number of bus driver vacancies |
| Ferries performance reports | Sydney ferries | Performance – on-time running | % of timetabled ferry services that were on time |
| NSW trains – performance reports (regional) | NSW trains | Performance – on-time running | Services are measured at their final destination and are determined to be 'on-time' when arriving at their final destination within 10 minutes of the timetable |
| Sydney Trains and NSW TrainLink (intercity) performance reports | Sydney Trains and NSW TrainLink | Performance – on-time running | Services arrive within 5 minutes for Sydney train services and 6 minutes for NSW TrainLink (intercity) services. |
| Customer on-time measure | Sydney Trains and NSW TrainLink | Customers on time and not on time (compared against train punctuality) | On-time: % of customers who arrive at their destination within 5 minutes of their planned arrival time<br>Not on-time: no description provided |
| Historical trains punctuality performance – | Sydney CBD network | Train punctuality | No description provided |

| Report | Mode | Measure | Measure description |
|---|---|---|---|
| Sydney network | | | |
| Sydney light rail – performance reports | Sydney light rail | Sydney light rail journey time | % of services within the maximum journey time plus 4 minutes tolerance, measured along the full length of the route |
| Customer satisfaction index | Public transport, roads, active transport, point-to-point | Overall, timeliness, safety and security, ticketing, convenience, accessibility, comfort, cleanliness, information, and customer service | % of passengers partly-to-very satisfied<br>% of passengers partly-to-very dissatisfied |

### B.5.3    Benchmarking

Translink Queensland mainly benchmarks its performance against its own historical data. This includes the NSW TrainLink regional performance dashboard, which enables comparison between regional area, service line, period type, financial year from 2015/16 to 2024/25, and by month (NSW TrainLink, 2025a). Specific performance targets, such as the Sydney Trains and NSW TrainLink (intercity) performance (NSW TrainLink, 2025b), are compared with interstate and international benchmarks.

## B.6    Nederlandse Spoorwegen

### B.6.1    Overview

Nederlandse Spoorwegen is the main passenger railway operator in the Netherlands, providing rail services on the Dutch main rail network. Nederlandse Spoorwegen also provides international rail services through Abellio, a wholly owned subsidiary that runs Abellio Greater Anglia, Merseyrail and ScotRail in the United Kingdom. Dutch rail infrastructure is managed by ProRail, which was split off from Nederlandse Spoorwegen in 2003. Freight services, formerly operated by Nederlandse Spoorwegen Cargo, merged with the DB Schenker group in 2000.

### B.6.2    Performance measures

On the Nederlandse Spoorwegen website, a dashboard is available, which shows the operator's current performance and historical performance levels (Nederlandse Spoorwegen, 2025a). Nederlandse Spoorwegen issues a detailed report on its transport plan every 6 months (Nederlandse Spoorwegen, 2025b).

There are two types of indicators in the 2015–2024 transport franchise that Nederlandse Spoorwegen was allocated by the Dutch Ministry of Infrastructure & Water Management:

- performance indicators: binding performance measures with baseline and target values
- information indicators: a non-binding performance measure that Nederlandse Spoorwegen reports on.

The list of all performance indicators used by Nederlandse Spoorwegen are shown in Table B.5 .

**Table B.5**  **Performance and information indicators used by Nederlandse Spoorwegen (adapted from Nederlandse Spoorwegen, 2025a)**

| Category | Subcategory |
| --- | --- |
| Reliability | Traveler punctuality (5 minutes) |
| | Traveler punctuality (15 minutes) |
| | Customer review – on time driving |
| | Arrival punctuality (3 minutes) |
| | Arrival punctuality (5 minutes) |
| | Trains operated |
| | Number of disruptions caused by Nederlandse Spoorwegen |
| | Train kilometres per infra kilometre |
| Door-to-door travel | Quality of Nederlandse Spoorwegen connections to other carriers |
| | Customer review – transfer time from other public transport |
| Travel convenience | Seating opportunities during peak hour |
| | Number of busy trains per working week during peak hours |
| | Customer rating – seating opportunities |
| | Occupancy rate during rush hour |
| | Passenger kilometres during rush hour |
| | Traveler kilometre |
| | Customer rating – cleanliness of trains |
| | Customer rating – safety stations |
| | Customer rating – use of the OV Chip Card |
| Travel information | User-friendly travel information |
| | Customer review – travel information in case of delay |
| | Delivery rate of bus transport in case of emergencies during rush hour |
| Safety | Customer review – social safety |
| | Number of Stop At Stop (ie, red signal) passages |
| General | General customer review |
| | Energy per passenger kilometre |
| | $CO_2$ emissions per passenger kilometre |
| | Customer rating – customer friendliness staff |
| | Customer rating – customer service |

## B.6.3 Benchmarking

Nederlandse Spoorwegen benchmarks its performance using a variety of indicators and reports. This includes using performance measures with baseline and target values, some of which are set in agreement with the Ministry of Infrastructure and Water Management. Nederlandse Spoorwegen also reviews its performance based on European service quality norms and publishes quality performance reports for both domestic (Nederlandse Spoorwegen Reizigers) and international (Nederlandse Spoorwegen International) services.

# B.7 United States of America national transit database

## B.7.1 Overview

The US Department of Transportation Federal Transit Administration manages the national transit database, which is a repository of data on the financial, operational and asset conditions of the USA's transit (public transport) systems. Public transport providers are required to report some of this data annually to the database and must include asset inventory data, condition assessments and performance results, projected targets for the next fiscal year, and a narrative report on changes in public transport system conditions and the progress toward achieving previous performance targets.

## B.7.2 Performance measures

The 2023 *National Transit Summaries and Trends* (US Department of Transportation Federal Transit Administration, 2023) document presents an overview of USA public transport performance using data from the national transit database. The categories of measures and example indicators reported on in this document are summarised in Table B.6            .

**Table B.6 Selected performance measures reported by the US Department of Transportation Federal Transit Administration (adapted from US Department of Transportation Federal Transit Administration, 2023)**

| Category | Subcategory | Example key performance indicators |
|---|---|---|
| Inventory of transit operators and service provision | Transit modes | Number of systems in operation by mode |
| | Types of service | Number of demand response modes by type of service |
| Transit service by area | Areas served by public transport | Passenger trips per capita (by urbanised area) |
| | Modes operated by area | Number of transit providers by urbanised area |
| Geographic coverage | Areas not served by transit | Urbanised areas with no fixed-route bus service |
| | Rail or fixed guideway | Miles of fixed guideway (directional route miles by mode) |
| Vehicle and facility asset inventory | Transit asset management | Percentage of revenue vehicles (by type) that meet or exceed the useful life benchmark[7] |
| | Revenue vehicles | Count of revenue vehicles by reporter type (capital responsibility only) |
| | Service vehicles | Count of service vehicles by reporter type (capital responsibility only) |
| | Americans with Disabilities Act of 1990 station accessibility | 10-year change in national total station accessibility by consolidated mode |
| | Bus fuel usage | Number of active fleet vehicles by fuel type |
| Asset condition and performance | Overall performance measures | Overall transit asset inventory and percentage of assets in state of good repair |
| | Useful life and age for revenue vehicles | Useful life for revenue vehicles by asset class |

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[7] This is the expected lifecycle of a capital asset for a particular transit provider's operating environment, or the acceptable period of use in service for a particular transit provider's operating environment.

| Category | Subcategory | Example key performance indicators |
|---|---|---|
| | Useful life and age for service vehicles | Service vehicle age by asset class |
| | Replacement cost for service vehicles | Average replacement cost by service vehicle asset class |
| | Condition assessments for facilities | Reported condition assessment of facilities |
| | Track miles | Total track miles by mode |
| | Mechanical failures | Vehicle revenue miles per mechanical failures by consolidated mode |
| Service supplied | Vehicle revenue miles | Vehicle revenue miles for rail modes serving urbanised areas by mode |
| | System capacity | Capacity-equivalent factor[8] by mode |
| | Average revenue speed | Average revenue speed by mode |
| Ridership | Service consumed by transit mode | National total unlinked passenger trips and passenger miles travelled by mode<br><br>Passenger trips per capita by urbanised area |
| | Average trip length | National average passenger trip length (passenger miles travelled per unliked passenger trip) by mode |
| | National ridership over time | National total unliked passenger trips over time |
| | Service effectiveness | National average occupancy (passenger miles travelled per vehicle revenue miles and seated occupancy percentage) by mode |
| Sources of funds | Sources of revenue | Sources of revenue by category (local, federal government taxes, fares, other revenue) |
| Capital funding | Types of capital expenses | Current year national total capital expenses by type (eg, guideway, passenger stations, vehicles) |
| Operating expenses | Operating expenditures by function and object class | Current year national operating expenses by function (eg, vehicle operations, maintenance, facility maintenance) |
| Service efficiency (cost per service supplied) | Operational expenditure efficiency | Operating expenditure per vehicle revenue mile/per capacity-equivalent vehicle revenue mile/per vehicle revenue hour |
| | Labour costs | Salaries and fringe benefits ($) and employee numbers |
| Cost effectiveness (cost per ride) | Operating expenditures per passenger mile | Operating cost per unlinked passenger trip/per passenger mile travelled |
| | Farebox recovery | Percentage of a trip's operating costs recovered through passenger fares |
| | Total federal assistance applied to transit and unliked passenger trips | Federal funding per unlinked passenger trip |
| Safety | Fatalities and injuries | Fatality and injury rates per vehicle revenue miles |
| | Derailments and collisions | Number of derailments and rail collisions |

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[8] The capacity-equivalent factor for each mode is calculated by dividing the average full-seating and full-standing capacities of active vehicles for each mode by the average full-seating and full-standing capacities of all bus vehicles in active service.

### B.7.3 Benchmarking

The 2023 *National Transit Summaries and Trends* document (US Department of Transportation Federal Transit Administration, 2023) highlights trends in performance measures over time, providing a method for benchmarking performance through year-on-year comparisons. In addition, the transit economic requirement model serves as another benchmarking tool for asset performance. This is used to rate the condition of assets and those falling below 3.0 are considered not in a state of good repair.

# Appendix C: Recommended measures for framework

| 1. Financial Subcategory | Measure ID | Measures (*headline measure) | Measure dimensions Mode | Network component | Service type | Time period | Customer segmentation | Other | Data source | Purpose |
|---|---|---|:---:|:---:|:---:|:---:|:---:|:---:|---|---|
| 1.1 Revenue | 1.1.1 | Fees and charges revenue (eg, fares)* | ✓ | ✓ | ✓ | ✓ | | ✓ | PTA records | B, C, D |
| | 1.1.2 | Third-party revenue* | | | | ✓ | | ✓ | | |
| | 1.1.3 | Grants and subsidies* | ✓ | | | ✓ | | ✓ | | |
| | 1.1.4 | General and targeted rates* | | | | ✓ | | ✓ | | |
| | 1.1.5 | Other income* | | | | ✓ | | ✓ | | |
| 1.2 Expenditure | 1.2.1 | Passenger services expenditure* | ✓ | ✓ | ✓ | ✓ | | ✓ | | |
| | 1.2.2 | Operations and maintenance expenditure* | ✓ | ✓ | | ✓ | | | | |
| | 1.2.3 | Public transport infrastructure improvements expenditure* | ✓ | | | ✓ | | | | |
| 1.3 Private share | 1.3.1 | Private share (private revenue as a proportion of operation expenditure)* | ✓ | ✓ | ✓ | | | | | |

| 2. Network | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Subcategory** | **Measure ID** | **Measures** <br> **(*headline measure)** | **Measure dimensions** | | | | | | **Data source** | **Purpose** |
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 2.1 Network structure | 2.1.1 | Number of routes | ✓ | ✓ | ✓ | | | ✓ | PTA records | C, D |
| | 2.1.2 | Route km | ✓ | ✓ | ✓ | | | ✓ | | |
| 2.2 Service provision | 2.2.1 | Scheduled capacity km* | ✓ | ✓ | ✓ | ✓ | | | | |
| | 2.2.2 | Scheduled service km | ✓ | ✓ | ✓ | ✓ | | | | |
| | 2.2.3 | Scheduled service trips | ✓ | ✓ | ✓ | ✓ | | | | |
| | 2.2.4 | Scheduled service hours | ✓ | ✓ | ✓ | ✓ | | | | |

| 3. Fleet and workforce | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Subcategory | Measure ID | Measures (*headline measure) | Measure dimensions | | | | | | Data source | Purpose |
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 3.1 Fleet | 3.1.1 | Number of vehicles by capacity (as per NZTA RUB capacity classification) | ✓ | ✓ | | | | ✓ | PTA and operator records | C, D |
| | 3.1.2 | Percentage of vehicles by age bracket | ✓ | ✓ | | | | ✓ | | |
| | 3.1.3 | Percentage of vehicles by vehicle type (propulsion) | ✓ | ✓ | | | | ✓ | | |
| | 3.1.4 | Percentage of vehicles with step-free access | ✓ | ✓ | | | | ✓ | | |
| | 3.1.5 | Percentage of vehicles with real-time audio and visual stop announcements | ✓ | ✓ | | | | ✓ | | |
| 3.2 Workforce | 3.2.1 | Workforce: actual as percentage of target* | ✓ | | | ✓ | | | | A, B, C, D |
| | 3.2.2 | Workforce: by duration of employment | ✓ | | | | | ✓ | | |
| | 3.2.3 | Workforce turnover: percentage of total FTE exiting workforce annually | ✓ | | | | | | | |
| | 3.2.4 | Percentage of split shifts | ✓ | | | | | | | |
| | 3.2.5 | Number of safety and security incidents impacting passenger service staff | ✓ | | | ✓ | | ✓ | | |

| 4. Infrastructure | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Subcategory** | **Measure ID** | **Measures (*headline measure)** | **Measure dimensions** | | | | | | **Data source** | **Purpose** |
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 4.1 Customer facilities | 4.1.1 | Percentage of stops, stations, interchanges and terminals that meet required features according to their stop classification (consistent with NZTA interchanges and stations design guidance) | ✓ | | | | | ✓ | PTA and local authority records | C, D |
| 4.2 Running way | 4.2.1 | Km bus or special vehicle lane, railway line in passenger service | ✓ | | | | | ✓ | | |
| | 4.2.2 | Proportion of scheduled bus and rail service or capacity km on dedicated or priority running way (bus or special vehicle lane or railway line) | ✓ | | ✓ | | | ✓ | PTA and local authority records and measures from category 2.2 | |

## 5. Customer experience

| Subcategory | Measure ID | Measures (*headline measure) | Mode | Network component | Service type | Time period | Customer segmentation | Other | Data source | Purpose |
|---|---|---|:---:|:---:|:---:|:---:|:---:|:---:|---|---|
| 5.1 Service frequency and span | 5.1.1 | Percentage of customers satisfied (rating of 6+ out of 10): service frequency (last trip) | ✓ | | | | ✓ | | Customer survey | C, D |
| | 5.1.2 | Percentage of customers satisfied (rating of 6+ out of 10): service span (last trip) | ✓ | | | | ✓ | | | |
| 5.2 Travel time | 5.2.1 | Average operating speed* | | ✓ | ✓ | ✓ | ✓ | | GPS vehicle tracking | B, C, D |
| | 5.2.2 | Percentage of customers satisfied (rating of 6+ out of 10): travel time (last trip) | | | | | ✓ | | Customer survey | |
| 5.3 Reliability | 5.3.1 | Operated (or cancelled) trips: percentage of scheduled trips operated (or cancelled)* | ✓ | ✓ | ✓ | ✓ | | | GPS vehicle tracking, operator records | A, B, C, D |
| | 5.3.2 | Operated (or lost) service: percentage of scheduled service kilometres operated (or lost) | ✓ | ✓ | ✓ | ✓ | | | | |
| | 5.3.3 | On time departure: percentage of operated trips departing from origin on time* | ✓ | ✓ | ✓ | ✓ | | | | |
| | 5.3.4 | On time departure: percentage of operated trips departing from intermediate timing points on time* | ✓ | ✓ | ✓ | ✓ | | | | |
| | 5.3.5 | On-time departure and arrival: percentage of operated trips | ✓ | ✓ | ✓ | ✓ | | | | |

| 5. Customer experience | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | departing from origin and arriving at destination on time* | | | | | | | | | |
| | 5.3.6 | Headway regularity: percentage of trips arriving between x% and x% of scheduled headway (eg, 0–120%)* | ✓ | ✓ | ✓ | ✓ | | | GPS vehicle tracking | |
| | 5.3.7 | On-time satisfaction: percentage of customers satisfied (rating of 6+ out of 10): last trip arriving and departing on time* | ✓ | ✓ | ✓ | ✓ | | | Customer survey | |
| 5.4 On-vehicle comfort | 5.4.1 | Percentage of peak-period services crowded (peak number of passengers onboard each service exceeds 100% of seats available) | ✓ | ✓ | ✓ | ✓ | | | Ticketing data, operator records | A, B, C, D |
| | 5.4.2 | Percentage of customers satisfied (rating of 6+ out of 10): on-board vehicle comfort on last trip* | ✓ | ✓ | | | ✓ | | Customer survey | |
| | 5.4.3 | Percentage of customers satisfied (rating of 6+ out of 10): vehicle condition on last trip | ✓ | | | | | ✓ | | B, C, D |
| | 5.4.4 | Percentage of customers satisfied (rating of 6+ out of 10): vehicle accessibility on last trip | ✓ | | | | | ✓ | | |
| 5.5 Facilities comfort | 5.5.1 | Percentage of customers satisfied (rating of 6+ out of 10): stops, stations, terminals quality* | ✓ | | | | ✓ | | | C, D |
| | 5.5.2 | Percentage of customers satisfied (rating of 6+ out of 10): stops, stations, terminals accessibility | ✓ | | | | ✓ | | | |

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| 5. Customer experience | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 5.6 Customer information | 5.6.1 | Percentage of customers satisfied (rating of 6+ out of 10): information available to help you plan and manage your journey on last trip | | | | | ✓ | | | |
| 5.7 Safety and security | 5.7.1 | Number of deaths and serious injuries on public transport | ✓ | | | | | ✓ | NZTA crash analysis system, PTA records | B, C, D |
| | 5.7.2 | Number of serious security incidents | ✓ | | | | | ✓ | PTA and operator incident register | |
| | 5.7.3 | Percentage of customers satisfied (rating of 6+ out of 10): safety and personal security on last trip* | ✓ | | | | ✓ | | Customer survey | A, B, C, D |
| 5.8 Financial cost to customer | 5.8.1 | Average fare per passenger km | ✓ | ✓ | ✓ | | | | Derived from measures in categories 1.1 and 6.1 | C, D |
| | 5.8.2 | Cost to customer (for average distance public transport trip or per passenger km): private passenger vehicle operating cost as a percentage of average public transport fare | | | | | | | Derived from measures in categories 1.1 and 6.1 and private vehicle operating cost data (eg, from Inland Revenue Department) | |
| | 5.8.3 | Percentage of customers satisfied (rating of 6+ out of 10): value for money of fare, last trip | ✓ | | | | ✓ | | Customer survey | |
| 5.9 Overall customer experience | 5.9.1 | Percentage of customers satisfied (rating of 6+ out of 10): overall trip (last trip)* | ✓ | ✓ | | | ✓ | | Customer survey | A, B, C, D |
| | 5.9.2 | Percentage of customers satisfied (rating of 6+ out of 10): access to public transport stop from journey origin | | | | | ✓ | | | C, D |
| | 5.9.3 | Percentage of customers satisfied (rating of 6+ out of 10): | | | | | ✓ | | | C, D |

| 5. Customer experience | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | access to public transport stop to journey destination | | | | | | | | |
| | 5.9.4 | Complaints* | | ✓ | ✓ | | | ✓ | PTA and operator complaint register | A, B, C, D |
| 5.10 Wider community perceptions | 5.10.1 | Community perception of public transport | | | | | | | Community survey (eg, NZTA journey experience monitor) | C, D |

| 6. Service use | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Subcategory** | **Measure ID** | **Measures** <br> **(\*headline measure)** | **Measure dimensions** | | | | | | **Data source** | **Purpose** |
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 6.1 Passenger demand | 6.1.1 | Boardings* | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | Ticketing data | B, C, D |
| | 6.1.2 | Passenger km* | ✓ | ✓ | ✓ | ✓ | ✓ | | | |
| | 6.1.3 | Percentage of population using public transport by range of time periods | | | | ✓ | ✓ | | Community survey – eg, NZTA journey experience monitor | C, D |
| 6.2 End-to-end journey | 6.2.1 | Percentage of customers by mode of access and egress to stop, station or terminal (last trip) | ✓ | | | | ✓ | | Customer survey | |
| 6.3 Mode share | 6.3.1 | Public transport mode share (journeys to work and education)* | | | | | ✓ | | Census | |
| | 6.3.2 | Public transport mode share (passenger km) | | | | | ✓ | | Household travel survey | |

## 7. Efficiency

| Subcategory | Measure ID | Measures (*headline measure) | Measure dimensions | | | | | | Data source | Purpose |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 7.1 Service utilisation | 7.1.1 | Boardings per service hour | ✓ | ✓ | ✓ | ✓ | | | Derived from measures in subcategories 6.1 and 2.2 | B, C, D |
| | 7.1.2 | Boardings as percentage of capacity | ✓ | ✓ | ✓ | ✓ | | | | |
| | 7.1.3 | Passenger km as percentage of capacity km* | ✓ | ✓ | ✓ | ✓ | | | | |
| 7.2 Cost efficiency | 7.2.1 | Operating cost per passenger km | ✓ | ✓ | ✓ | ✓ | | | Derived from measures in subcategories 6.1 and 1.2 | |
| | 7.2.2 | Operating cost per service km | ✓ | ✓ | ✓ | ✓ | | | Derived from measures in subcategories 2.2 and 1.2 | |
| | 7.2.3 | Operating cost per unit of capacity km* | ✓ | ✓ | ✓ | ✓ | | | Derived from measures in sub categories 2.2 and 1.2 | |

## 8. Transport system outcomes

| Subcategory | Measure ID | Measures (*headline measure) | Measure dimensions | | | | | | Data source | Purpose |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | Mode | Network component | Service type | Time period | Customer segmentation | Other | | |
| 8.1 Healthy and safe people | 8.1.1 | Number of deaths and serious injuries on public transport [repeated from subcategory 5.7] | ✓ | | | | | | NZTA crash analysis system | C, D |
| | 8.1.2 | Number of deaths and serious injuries per passenger km: ratio of private passenger vehicle to public transport | | | | | | | NZTA crash analysis system, public transport passenger km from measure in subcategory 6.1, vehicle passenger km household travel survey | |
| 8.2 Resilience and security | 8.2.1 | Operated (or cancelled) trips: percentage of scheduled trips operated (or cancelled) [repeated from measure 5.3.1] | | | | ✓ | | | GPS vehicle tracking, operator records | |
| | 8.2.2 | Number of reported serious security incidents per passenger km [repeated from subcategory 5.7] | | | | ✓ | | | PTA, operator incident register, passenger km from measure in subcategory 6.1 | |
| 8.3 Economic prosperity | 8.3.1 | Percentage of jobs in region within 30 and 45 minutes door-to-door travel time for the average resident, AM peak* | | | | | | | Public transport network from PTA network and schedule data  Jobs and resident population from Census | |
| | 8.3.2 | Percentage of jobs in region within 30 and 45 minutes door-to-door travel time for the | | | | | | | As above | |

| 8. Transport system outcomes | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | average resident, AM peak: ratio of private passenger vehicle vs public transport | | | | | | | Private vehicle access from regional transport models. | |
| 8.4 Environmental sustainability | 8.4.1 | Average grams carbon dioxide emitted per passenger km | ✓ | | | | | | Requires further investigation | C, D |
| | 8.4.2 | Greenhouse gas emissions (grams carbon dioxide per passenger km): ratio of private passenger vehicle to public transport | | | | | | | | D |
| 8.5 Inclusive access | 8.5.1 | Percentage of population living within 400m and 800m of a public transport stop via footpath network | ✓ | ✓ | ✓ | | ✓ | | Population and jobs: Census<br>Public transport stops: PTA records | C, D |
| | 8.5.2 | Percentage of jobs within 400m and 800m of a public transport stop via footpath network | ✓ | ✓ | ✓ | | | | | |
| | 8.5.3 | Percentage of population and jobs (combined) within 400m and 800m of a public transport stop via footpath network | | | | | | | | |
| | 8.5.4 | Percentage of population within 30 min and 45 min public transport travel time (AM peak) to an activity centre* | | ✓ | | | ✓ | | Public transport network from PTA network and schedule data<br>Population from Census<br>Activity centres from local authority plans | |
| | 8.5.5 | Access to destinations: community perception | | | | | ✓ | | Community survey – eg, NZTA journey experience monitor | |

# Glossary

**Delivery (measure):** Measure of extent of activity. Contrasts with measures of 'input' or 'outcome'.

**Dimension:** Factor by which a measure can be disaggregated in reporting (eg, by age of customer, mode of public transport).

**Effectiveness:** The extent to which a desired objective is achieved, regardless of the resources used.

**Efficiency:** The extent to which productivity is maximised from the resources used.

**Framework:** Structure for organising measures.

**Headway:** Time between public transport services.

**Indicator:** Synonym for 'measure'.

**Input (measure):** Measure of resources used by an activity. Contrasts with measures of 'delivery' or 'outcome'.

**Journey:** A person's travel between an origin and destination; 'door-to-door'. May involve multiple public transport boardings and journey stages using multiple transport modes (eg, walking to and from public transport).

**Journey experience monitor:** Ongoing survey of New Zealand adults about travel behaviour and customer perceptions of the multi-modal transport system, administered by NZTA.

**Land transport benefits framework:** NZTA framework that includes definitions of a set of benefits that may arise from transport investment and associated measures.

**Level of service:** A type of measure of the quality of customer or user experience, usually expressed in grades reflecting relative performance (eg, A to F).

**Measure:** A quantitative description of the amount or degree of a factor relevant to public transport performance.

**Operator:** The organisation that directly operates public transport services. In the current New Zealand context, these are private companies contracted by PTAs.

**Outcome (measure):** Measure of the end result of an activity. Contrasts with measures of 'input' or 'delivery'.

**Passenger trip:** A passenger's travel on a public transport vehicle, from boarding to alighting. A passenger trip forms one part of a wider 'journey'. Note the separate definition of 'trip', which has a distinctly different meaning.

**Patronage:** Passenger trips or boardings.

**Public transport:** Passenger transport available for use by the public. In this report, it refers to services contracted to PTAs or that have significant patronage, subsidy and importance to the network, including urban bus, rail, ferry and on-demand services, and relevant inter-regional services (eg, the Te Huia rail passenger service). This excludes total mobility services, school bus services and passenger transport services that operate on a purely commercial basis, including long-distance passenger rail, coach and air services, and some urban services.

**Public transport authority:** An organisation that has legal responsibility for planning, managing, funding, and delivering public transport services and some infrastructure within a region. PTAs include regional

councils, unitary authorities, Auckland Transport and Invercargill City Council (which has delegated authority from Southland Regional Council).

**Public transport sector:** Organisations involved with planning, managing, funding and delivering the public transport system in New Zealand, including operators, PTAs, territorial and unitary authorities, other RCAs, KiwiRail (as the rail network provider), and central government agencies including NZTA.

**Regional council:** A local government organisation that manages natural resources at the regional level, including land, air and water, supports biodiversity and biosecurity, and provides regional transport services. Regional councils are typically responsible for public transport within a region through their role as a PTA.

**Regional public transport plan:** Statutory plan for public transport services and infrastructure in a region, prepared and adopted by the relevant PTA. PTAs are required to prepare a RPTP as part of the Land Transport Management Act 2003.

**Ridership:** Alternative term for patronage, commonly used in North America.

**Road controlling authority:** An organisation that has legal responsibility for a road, which public transport services may operate over, and on which bus lanes and other public transport priority may be provided. Road controlling authorities include government departments, territorial authorities, unitary authorities and airport companies, and NZTA, which has responsibility for state highways.

**Route:** The path on which a service operates between the route origin and destination. This term is also used to collectively refer to all services that use a particular path.

**Running way:** A mode-neutral term to describe the infrastructure on which PT vehicles operate. For buses this may be a road, bus lane or busway. For trains this is a railway.

**Service:** Defined by the Land Transport Management Act 2003 as an operation carried out on one occasion only, which is also referred to as a 'trip'. This term is also used to collectively refer to all services or trips operating on a route or multiple routes.

**Service span:** The times of day and days of the week within which a service operates.

**Territorial authority:** A local government organisation that is responsible for local services including roads, water reticulation, sewerage, refuse collection, libraries, parks, recreation services, local regulations, community and economic development, and town planning. In the context of public transport, territorial authorities provide some passenger infrastructure, such as bus stops, ferry terminals and train stations, and road infrastructure, such as public transport priority measures, through their role as a road controlling authority.

**Transit:** Alternative term for public transport, commonly used in North America.

**Translink:** Public transport agency in Queensland, Australia.

**TransLink:** Public transport agency in Vancouver, Canada.

**Trip:** A single occurrence of a service operating the length of a route. Note the separate definition of 'passenger trip', which has a distinctly different meaning.

**Unitary authority:** A local government organisation with the functions of both a territorial authority and a regional council.

**Vertical integration:** The concept of consistency in the use and definition of measures by different organisations, across different geographic scales of analysis or for different measurement purposes.