Framework for Improving ASEAN Infrastructure Productivity

one vision
one identity
one community

Framework for Improving ASEAN Infrastructure Productivity

The ASEAN Secretariat
Jakarta

The Association of Southeast Asian Nations (ASEAN) was established on 8 August 1967. The Member States are Brunei Darussalam, Cambodia, Indonesia, Lao PDR, Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam.

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ASEAN: A Community of Opportunities for All

The development of the Framework for Improving ASEAN Infrastructure Productivity was supported by the ASEAN-Australia Development Cooperation Program Phase II (AADCP II).

Foreword

Sustainable infrastructure is at the heart of ASEAN Community Vision 2025 and key to improving ASEAN Connectivity. Oftentimes, rapid infrastructure investments could lead to sub-optimal productivity across all stages of the lifecycle. Improving infrastructure productivity is vital as it allows economic growth to be optimised and strengthens the allocation of scarce resources and funding.

The Framework for Improving ASEAN Infrastructure Productivity under the Master Plan on ASEAN Connectivity (MPAC) 2025 is a timely initiative to strengthen our infrastructure planning, delivery, and operations. The seven workstreams and two toolkits in the Framework will help ASEAN Member States prioritise their capacity building needs and customise specific actions.

I would like to encourage relevant agencies and stakeholders in ASEAN Member States to make use of this Framework to improve their infrastructure productivity. Doing so is not an overnight undertaking. With focus and determination, ASEAN can forge cooperation with its partners to deliver this initiative.

As the region recovers from the COVID-19 pandemic, ASEAN may want to seize the moment to reimagine and reinvent sustainable infrastructure and strengthen capacity to improve infrastructure productivity. The Framework will provide an avenue for sharing knowledge, sector-specific insights, and best practices where we can learn from one another and enable policymakers to take concrete actions. Let us work together as a cohesive region and make ASEAN a better home with more productive infrastructure for future generations.

Dato Lim Jock Hoi
Secretary-General of ASEAN

Preface

ASEAN is situated in a dynamic environment where it needs to address the challenge of improving overall productivity to sustain economic progress. The Asian Development Bank (ADB) estimated that ASEAN's infrastructure investment needs would total USD 2.8 trillion (2015 prices) between 2016 and 2030 or USD 184 billion annually[1] to meet the region's economic growth and facilitate the growing trend of urbanisation.

With multiple infrastructure requirements competing for resources, ASEAN will need to significantly increase infrastructure investment and observe efficient and sustainable use of resources in the region. Improving infrastructure productivity across all stages of the infrastructure lifecycle will allow economic progress across each country (and region/s) to be maximised and allow scarce resources and funding to be allocated most efficiently. Past studies have found that better project selection process, more efficient delivery, and maximising the life span and capacity of existing assets significantly reduce the cost and improve infrastructure productivity.

To help address this challenge, ASEAN, with the support of the ASEAN-Australia Development Cooperation Program Phase II (AADCP II), has developed the Framework for Improving ASEAN Infrastructure Productivity under the Master Plan on ASEAN Connectivity (MPAC) 2025.

The Framework for Improving ASEAN Infrastructure Productivity would seek to promote and improve infrastructure productivity in ASEAN by achieving the following:

- Ensuring existing infrastructure projects and assets are optimally utilised
- Identifying opportunities to reduce the cost of infrastructure for ASEAN Member States
- Ensuring robust merit-based selection criteria are applied on infrastructure projects selection process with a view to achieve the best value for money
- Enhancing the capacity of various agencies in collecting data allowing for more informed decision making in the project selection and analysis process
- Helping infrastructure planners and implementers of ASEAN Member States to benefit from a productive and efficient delivery of infrastructure projects

The development of the Framework has provided opportunities for Lead Implementing Body for Sustainable Infrastructure (LIB-SI) to work with key relevant stakeholders, including ASEAN Senior Transport Officials Meeting (STOM), Senior Officials Meeting on Energy (SOME), and Working Committee on Capital Market Development (WC-CMD) Infrastructure Finance Working Group (IFWG) to develop concrete workstreams. We are grateful for the support and hopeful that the Framework would further foster more knowledge exchanges and policy dialogues on sustainable infrastructure in the region.

1 Asian Development Bank. *Meeting Asia's Infrastructure Needs*, 2017.

The Framework would support and complement MPAC 2025's Initiative 1 on the Initial Rolling Priority Pipeline of ASEAN Infrastructure Projects and Initiative 3 on ASEAN Sustainable Urbanisation Strategies (ASUS), to which ASEAN Member States could make reference to enhance and advance the Initial Pipeline and sustainable urbanisation projects in cities. We are confident that this Framework will play an important role in helping ASEAN build an ASEAN Community that will contribute to a more competitive, resilient, and well-connected ASEAN.

Luong thi Hong Hanh
Chair of the LIB-SI
Deputy Director General
Department for Infrastructure and Urban Centers
Ministry of Planning and Investment of Viet Nam

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List of Abbreviations and Acronyms

AADCP II	ASEAN-Australia Development Cooperation Programme Phase II
ADB	Asian Development Bank
AMS	ASEAN Member States
ASEAN	Association of Southeast Asian Nations
ATAP Guidelines	Australian Transport Assessment and Planning Guidelines
Bappenas	National Development Planning Agency of Indonesia
DBFOT	Design-Build-Finance-Operate-Transfer
DP	Dialogue Partner
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessments
FDOT	Florida Department of Transportation
FRI	Flood Resilience Index
GCA	Government Contracting Agency
GMS	Greater Mekong Subregion
G2G	Government-to-Government
IFWG	Infrastructure Finance Working Group
KPI	Key Performance Indicator
LIB-SI	Lead Implementing Body for MPAC 2025 Strategic Area of Sustainable Infrastructure
LTA	Land Transport Authority
MDB	Multilateral Development Bank
MOF	Ministry of Finance
MOT	Ministry of Transport
MPI	Ministry of Planning and Investment
MPAC 2025	Master Plan on ASEAN Connectivity 2025
NEA	National Environment Agency
NECC	National Economic Coordination Committee
NIA	National Infrastructure Assessment
NIC	National Infrastructure Commission
NIP	National Infrastructure Plan
NIU	National Infrastructure Unit
ODA	Official Development Assistance
OEP	Other External Partner
OPBC	Output and Performance Based Contracting
O&M	Operations and Maintenance
PPP	Public-Private Partnership
PUB	Public Utilities Board

REACH	Singapore Government's feedback unit Reaching Everyone for Active Citizenry
SIA	Social Impact Assessment
SOME	ASEAN Senior Officials Meeting on Energy
STOM	ASEAN Senior Transport Officials Meeting
TEU	Twenty-foot Equivalent Unit
TSR	Travel Smart Reward
VfM	Value for Money
WC-CMD	ASEAN Working Committee on Capital Market Development

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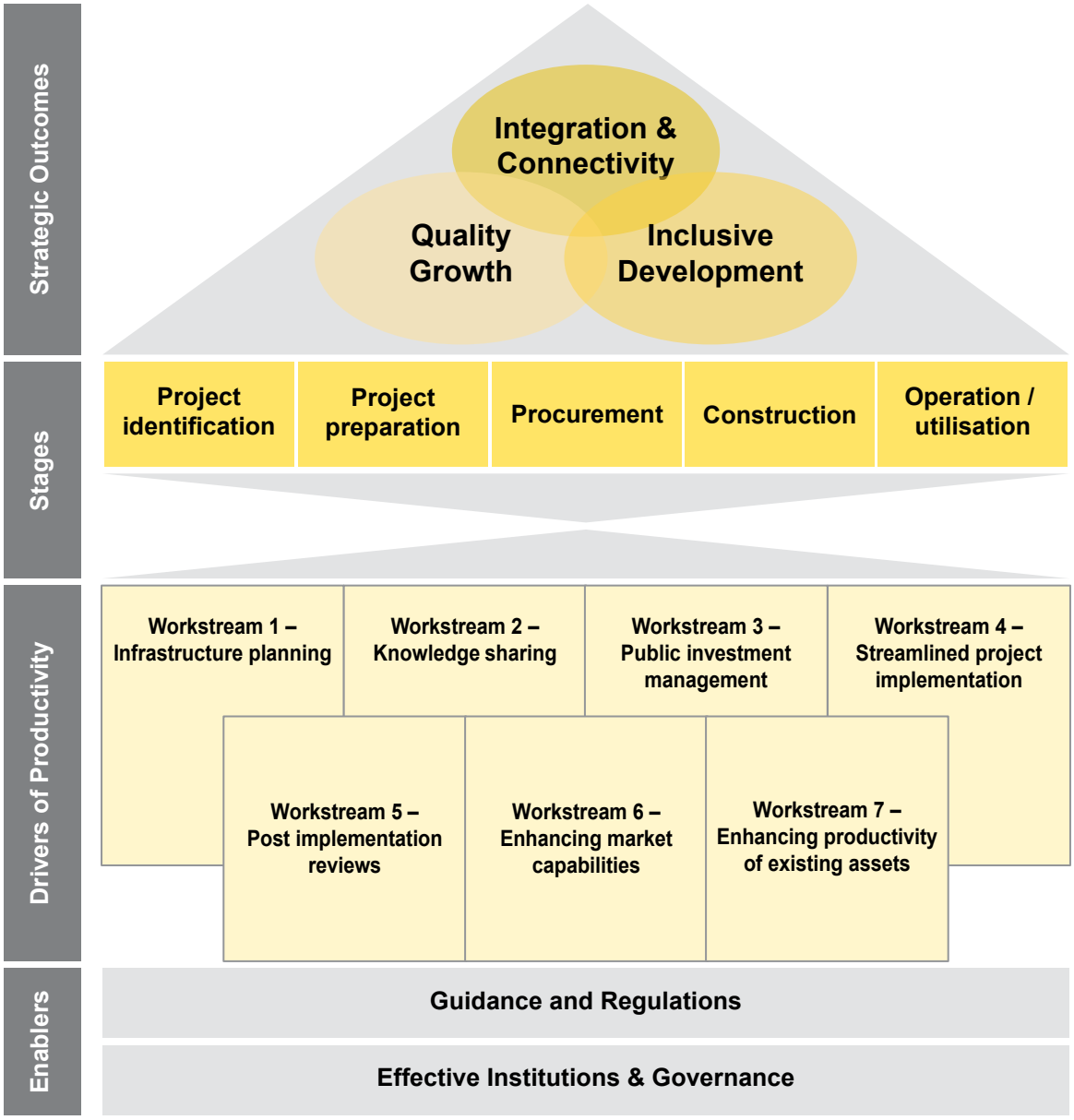
Framework for Improving ASEAN Infrastructure Productivity

Overview of the Framework for Improving ASEAN Infrastructure Productivity



Executive Summary

- The Master Plan on ASEAN Connectivity (MPAC) 2025, adopted by ASEAN Leaders in September 2016 in Vientiane, Lao PDR, aims to achieve a seamlessly and comprehensively connected and integrated ASEAN that will promote competitiveness, inclusiveness, and a greater sense of Community. It comprises fifteen initiatives in the five strategic areas of: (a) Sustainable Infrastructure; (b) Digital Innovation; (c) Seamless Logistics; (d) Regulatory Excellence; and (e) People Mobility.

- The Framework for Improving ASEAN Infrastructure Productivity (the "Framework") is one of the milestones under the MPAC 2025 Strategic Area of Sustainable Infrastructure. The Framework consists of seven workstreams with accompanying priority actions. Two toolkits were developed to support the implementation of the Framework.

- ASEAN is situated in a vibrant environment where it needs to address the challenge of improving overall productivity to sustain economic progress. Given limited resources and considering the huge infrastructure needs in the region, ASEAN will need to increase not only in the infrastructure spending but also in the productivity of the infrastructure itself. The Framework aims to address this challenge, assisting relevant stakeholders across ASEAN Member States (AMS) to make informed and evidence-based policies towards improving infrastructure productivity across the entire infrastructure project lifecycle.

- Ten major trends are shaping infrastructure productivity in ASEAN:

    1. **Trend 1: Accelerated pace of infrastructure development** - to reduce the current infrastructure gap in ASEAN, new infrastructure projects are being delivered in fast-tracked programmes.

    2. **Trend 2: Increased reliance in robust and verified data** – globally, infrastructure planners and providers are moving towards a much more analytical, data-driven and evidence-based approach to infrastructure planning, prioritisation and development.

    3. **Trend 3: Embracing data sharing** – governments should be in the driving seat of encouraging and facilitating data and analytics within the infrastructure sector, particularly with respect to planning.

    4. **Trend 4: Technology - opportunities and risks** – assessing the risk and devising mitigation strategies in case the assets become technologically obsolete before the end of their anticipated operational lifecycle.

    5. **Trend 5: Adopting alternative financing structures** – developing countries in ASEAN recognise the importance of introducing private sector investment in infrastructure, such as public-private partnerships (PPPs).

    6. **Trend 6: Getting more out of existing assets** – demand management and capacity enhancements are strategies being adopted to better utilise infrastructure without the burden on excessively huge capital spend.

7. **Trend 7: Factoring resilience in infrastructure investments** – resilience can be improved by building in flexibility into infrastructure, having supportive regulatory frameworks, and incentivising the private sector to play an active role in finding innovative solutions.

8. **Trend 8: Consulting the customer** – customers' demand for real-time information and insights indicate that access to data is quickly becoming just as important to customers as access to physical services.

9. **Trend 9: Maturing regulatory design** – in ASEAN, the maturing of investment laws, public procurement laws, privatisation and concession laws, environmental protection laws, and sectoral regulations are positively impacting private participation in infrastructure projects.

10. **Trend 10: Sector capacity building** – it is important that governments assess the readiness for undertaking major capital projects as the sectors evolve and examine resource constraints in the local and regional markets.

- The Framework contains seven workstreams which will be a catalyst to drive and improve infrastructure productivity and are the key drivers to achieve the strategic outcomes of quality growth, inclusive development, and greater integration and connectivity in ASEAN.

- These workstreams were developed through a comprehensive process: (a) identified and defined infrastructure productivity; (b) research on the local and global infrastructure landscape including identifying key trends, gathered relevant frameworks globally and across ASEAN and consultations with the key agencies covering a broad spectrum of infrastructure sectors across all AMS; (c) developed criteria to prioritise the workstreams and priority actions which form the Framework; and (d) developed the Framework incorporating feedback from AMS including comments gathering from the two-day Forum on improving ASEAN infrastructure productivity.

- Whilst the priority actions under each of the seven workstreams can be undertaken individually, the impact of each priority action or workstream may be enhanced through coordinated activities in a number of workstreams which complement each other. The workstreams and suggested priority actions are outlined below.

Workstreams	Priority Actions
Workstream 1: Infrastructure planning	a. Map the infrastructure ecosystem b. Improve inter-agency communication and coordination. c. Define target outcomes for implementing agencies/line ministries d. Build regional connectivity objectives into national infrastructure strategy and sector master plans e. Prioritise infrastructure planning with interdependencies which have a multiplier effect on the benefit f. Engage stakeholders early on major projects g. Develop a project screening, selection and prioritisation procedures h. Establish rigorous policy and procedures for dealing with unsolicited proposals

Workstreams	Priority Actions
Workstream 2: Knowledge sharing	a. Understand customer preferences and trends b. Promote systematic collection of data c. Back up project proposals with current data and robust forecasts d. Facilitate greater data sharing among government agencies and stakeholders e. Collect project data during and after project implementation f. Regular reporting by agencies on key metrics aligned with target outcomes
Workstream 3: Public investment management	a. Provide greater certainty of funding for infrastructure projects b. Consider whole of life costs of an asset when making investment decisions c. Promote budgeting for infrastructure maintenance d. Promote the use of PPP or Output and Performance Based Contracting
Workstream 4: Streamlined project implementation	a. Put in place plans for approvals and land acquisition early b. Undertake Environmental and Social Impact Assessments early c. Optimise the contracting structure d. Set appropriate qualification and evaluation criteria for bidder selection e. Enforce rigorous procedures for unsolicited proposals f. Strengthen contract management capability
Workstream 5: Post implementation reviews	a. Promote regular practice of "post implementation reviews" b. Develop a feedback system to address the findings c. Leverage on review findings from international agencies d. Continue assessment into the operations phase
Workstream 6: Enhancing market capabilities	a. Enhance construction and maintenance sector capabilities b. Promote adoption of internationally recognised standards c. Encourage domestic financial institutions to participate in financing infrastructure projects
Workstream 7: Enhancing productivity of existing assets	a. Broaden the delivery options assessment at pre-feasibility stage b. Use new technologies to improve infrastructure efficiency c. Seek private sector innovation d. Implement demand management measures e. Invest in maintenance / rehabilitation of assets

- Two toolkits were prepared to support the implementation of the workstreams and priority actions. Toolkit 1 (Prioritisation Toolkit) aims to assist AMS to self-assess their performance across each workstream, identify, and prioritise workstreams and priority actions which would have the biggest impact on infrastructure productivity in their country, and identify relevant capacity building needs at a national level. Toolkit 2 (Action Plan Toolkit) aims to help AMS customise their individual action plans for implementation.

1. Introduction

1. Introduction

ASEAN will continue to strengthen the foundations for sustainable infrastructure development and cooperation. Infrastructure connects our economies, shapes our life, and deliver socio-economic benefits. Improved infrastructure can help governments to increase budget savings and economic growth, businesses to reduce trade costs and increase profits, and citizens to improve their quality of life.

With expanding populations and increasing needs to sustain economic growth, there is heightening pressure on the abilities of infrastructure to cope in ASEAN. In addition to investing in new projects, ASEAN Member States (AMS) need to get more out of the existing capacity.

Infrastructure productivity involves a complex process management on several aspects such as project selection, structuring, design, financing, operation, and management which require a holistic approach. It is acknowledged that infrastructure productivity may be considered a relatively new concept for ASEAN. There was no rule of thumb on the definition of infrastructure productivity as each infrastructure asset will have its own purpose and will be subject to its specific sector benchmarks and challenges.

The Framework for Improving ASEAN Infrastructure Productivity is designed to help AMS reach a common understanding and appreciation of the importance of infrastructure productivity at all levels of the infrastructure project cycle, enabling them to improve their future infrastructure planning, delivery, and operation. It is recognised that AMS may have different plans, strategies, priorities, as well as regulatory and institutional environments related to infrastructure.

The Framework would be critical to deliver infrastructure in the most efficient and sustainable way possible. To operationalise the Framework, a strong enabling environment, underpinned by a robust regulatory framework and strong institutional and governance arrangements in developing and delivering infrastructure projects, would be key to ensure the implementation of the workstreams effectively drive infrastructure productivity in ASEAN.

The content of this publication is divided into five chapters comprising i) Introduction; ii) Key Trends Impacting Infrastructure Productivity; iii) Stocktake of Existing Framework; iv) Infrastructure Productivity Workstreams; and v) Making It Happen. Several annexes are included to provide readers with more information on the approach undertaken in developing the Framework, global infrastructure productivity and performance frameworks, workstream priority actions, and toolkits to support the implementation of the Framework.

2. Key Trends Impacting Infrastructure Productivity

2. Key Trends Impacting Infrastructure

This chapter explores the key emerging trends impacting infrastructure productivity today and the primary forces behind them. These trends will continue to evolve and drive the transformation of the infrastructure industry, forcing infrastructure planners and providers to rethink their role and past approaches. These trends are also impacting users, altering the way they interact with infrastructure. Consequently, both private and public sector entities will need to adapt and adjust their strategies to deal with the unique opportunities and risks they now face.

Understanding the key trends shaping the world of infrastructure (both globally and regionally in the ASEAN context) is key to developing an infrastructure productivity framework which will remain practical for the foreseeable future. It helps to highlight the imminent changes impacting infrastructure productivity in the medium to long term and keep focus on what industry stakeholders considers to be important. AMS are growing at unequal rates and their responses to these trends are therefore not expected to be identical. Nonetheless, improved infrastructure productivity achieved at any level (national, sub-national, regional or sub-regional) will contribute to better regional connectivity in ASEAN.

Based on a comprehensive review of the relevant literature and consultation with policymakers, infrastructure owners and operators, the following ten trends were identified:

- Accelerated pace of infrastructure delivery
- Increased reliance in robust and verified data
- Embracing data sharing
- Technology: opportunities and risks
- Adopting alternative structures
- Getting more out of existing assets
- Factoring resilience in infrastructure investments
- Consulting the customer
- Maturing regulatory design
- Sector capacity building

2.1. Trend 1: Accelerated pace of infrastructure development

Infrastructure in developing countries in ASEAN is being developed at an astonishing pace[2]. To reduce the current infrastructure gap, new infrastructure projects are being delivered in fast-tracked programmes as governments focus on enhancing infrastructure development quickly. There are risks in building infrastructure too quickly, including the possibility of building to specifications that do not match the current and future needs of the respective markets.

Two necessary conditions for a successful infrastructure programme are (1) appropriate strategic planning and (2) central coordination of agencies, particularly so if the programme is to be delivered in an accelerated pace. This requires identifying which investments should be undertaken, determining the essential components, needs and trade-offs, and how they should be prioritised. Conversely, weak or insufficient planning can impede their successful implementation and operation later in the project cycle. As a result, infrastructure interdependences may not be able to realise their full potential, and countries will not be able to enjoy the full wider benefits.

Key points:

Strategy and master plans

Establishing a national long-term strategy that addresses infrastructure needs is important as it provides a clear direction for public agencies and private participants. In this period of significant economic volatility, technological disruption, and climate change, the strategy should provide guidance on how the needs should be met, with flexibility for adjustment as more information is gathered. Having an established process for generating, monitoring and adjusting the national infrastructure strategy will help governments in the difficult but important task of maintaining the right strategy to meet the governments' objectives.

It is also important to align national strategies and sector master plans across the national and subnational levels as it helps reduce a series of potential gaps or contradictions between policy objectives, fiscal arrangements and regulations across levels of government, which can undermine the design and implementation of infrastructure strategies. It encourages a whole-of-government perspective on infrastructure.

Central coordination of agencies

Infrastructure development serves multiple objectives, with multiple policy goals such as growth, productivity, affordability, inclusive development, environmental objectives, potentially being in opposition. As these issues cut across different institutions, jurisdictions, levels of government, policy areas, and professional disciplines, aggregating them into a coherent view is challenging in this rapidly changing environment. Analyses are often done in silos if there is no dedicated unit or institution responsible for monitoring, generating, assessing, costing, and creating debate around national infrastructure objectives. Horizontal coordination mechanisms across institutions and jurisdictions contribute to encouraging economies of scale for infrastructure investment and enhance the affordability of an asset for users.

2 "In the past decade, developing Asia has built more infrastructure across all sectors than any other developing region". (ADB, *Meeting Asia's Infrastructure Needs*, 2017, Section 2.2,)

Adapting to the trend

Balancing the desire to close the infrastructure gap quickly, governments will need to take the time to have robust considerations on project suitability, resilience, and sustainability. With large infrastructure needs but limited funding, prioritising assets to be built at the right time to deliver the most value is one of the challenges even governments in mature markets grapple with. Ultimately, governments will need to take a more holistic view of the wider benefits they are trying to achieve from their investments.

Governments across the world and in ASEAN are responding to this trend by establishing a central coordinating body. This body helps coordinate efforts of different stakeholders in the infrastructure development process by ensuring stakeholder efforts are aligned to the national master plan. For example, the National Development Planning Agency (Bappenas) in Indonesia acts as a central coordinating agency at the national level[3]. Bappenas formulates the national development plan and is responsible for the implementation of this plan. This is achieved by coordinating policies in the respective fields, sourcing of domestic and foreign funding, budgeting and designing of infrastructure, and handling of urgent and large-scale problems.

Similar coordination bodies have been set up in other AMS, such as Myanmar (National Economic Coordination Committee, or NECC), Philippines (PPP Center), and Viet Nam (Ministry of Planning and Investment, or MPI). However, global experience shows that the effectiveness of establishing a coordinating agency is dependent on the agency's designed role, function, and mandate. In the absence of such a coordinating agency, having robust coordination mechanisms for infrastructure policy within and across levels of government would encourage a balance between a whole-of-government perspective and sectoral and regional views. Examples of such mechanisms include establishment of policy exchange platforms, formal coordination platforms, and co-financing arrangements for shared responsibilities and requirements for receiving central funds. A coordinated approach in developing master plans underpinned by a well-defined strategy provides clear direction for both the public and private sectors.

2.2. Trend 2: Increased reliance in robust and verified data

As technology starts to play a greater role in the delivery of infrastructure, access to data will become one of the essential building blocks. Globally and in ASEAN, infrastructure planners and providers are moving towards a much more analytical, data-driven and evidence-based approach to infrastructure planning, prioritisation, and development[4]. Harvesting data and using it for (1) evidence-based planning and (2) performance monitoring allow for better predictive analysis and asset management which in turn drives better productivity.

As the world becomes more proficient at turning data into insights, opportunities will emerge for infrastructure owners, operators and planners. As more investments and resources are dedicated towards uncovering the insights, planners are not only looking

3 Bappenas website. *Role and Function of Bappenas*. https://www.bappenas.go.id/en/profil-bappenas/tupoksi/, 2019

4 Mckinsey &Company, *How advanced analytics can benefit infrastructure capital planning article* (https://www.mckinsey.com/industries/capital-projects-and-infrastructure/our-insights/how-advanced-analytics-can-benefit-infrastructure-capital-planning), 2018.

to create a much stronger alignment between supply and future demand, but also to improve the overall effectiveness of the planning process. Likewise, operators hope to unlock operational efficiencies such as increasing productivity, extending asset life spans, and reducing operating and maintenance costs. While some governments have already made significant progress moving towards evidence-based decision-making processes, there is still significant scope for the application of data and analytics within the infrastructure planning and prioritisation process for AMS.

Key points:

Evidence-based Planning

Evidence-based planning and prioritisation enables infrastructure authorities to not only make better decisions, but also create stronger consensus in society to support those decisions. Relevant data would include the projected and actual performance of the asset, the cost of construction, finance, operation, the contract terms, as well as relevant procedural information. While many AMS use some form of quantitative analysis (e.g. cost-benefit analysis) when choosing whether to pursue a particular investment as well as which delivery modality, it is not always underpinned by robust and verified data. Unfortunately, although many countries do collect data, most of the data that would be required to compare the overall costs of projects financed through various alternative mechanisms is not systematically collected, processed or disclosed.

Performance Monitoring

The lack of collection and systematic publication of performance data also impedes effective monitoring of assets' performance. The use of key performance indicators (KPIs) to oversee the performance of infrastructure service delivery is, however, rapidly developing and proving a strong tool to monitor and benchmark the performance of infrastructure in their operating phase. While governments and operators are increasing their reliance on data and analytics to better govern and oversee infrastructure delivery, investors on the other hand are using it to assess the value and resilience of their investments.

Adapting to the trend

As evidence-based decision-making comes into focus and infrastructure players become more proficient at turning data into insights, governments are starting to place much greater value on the insights they can gather from comparable data and predictive analytics. Decision-makers are no longer solely relying on past practices. Therefore, it is put in place systems that ensure a systematic collection of relevant financial and non-financial data and institutional responsibility for analysis, dissemination, and learning from this data. It is only meaningful if relevant data are made publicly available in an accessible format and in a timely fashion[5]. Examples of governments adapting to the increase of useful data available for collection and analysis can be seen in a number of AMS. For instance, Land Transport Authority of Singapore (LTA) has a team of data scientists armed with smart analytics tools to process data to provide insights on travel behaviour, traffic conditions, and trends related to travel patterns, with the objective to

5 More details elaborated in Trend 3 (Embracing Data Sharing)

improve commuter experiences[6]. Some of the LTA's methods of collecting data include the following:

- mapping hotspots across Singapore with peak volume of commuters at transportation nodes through statistics from fare payment card (EZ-link[7]) transactions;
- assessment on whether transport supply is affected due to weather conditions through meteorological information from National Environment Agency (NEA); and
- detecting the number of vehicles at busy road junctions via drone aerial footages.

2.3. Trend 3: Embracing data sharing

As highlighted in Trend 2 (Increased reliance in robust and verified data), data is rapidly becoming the backbone of the infrastructure sector. It has the power to transform the way governments, planners, developers, owners and operators manage infrastructure and can lead to a dramatically improved user experience. While the benefits of data sharing are clearly understood, the application is constrained by mixed views on who owns what data and how it can be used.

There is no one party which owns all of the data available for smart infrastructure decision-making. Firstly, some data are proprietary (like company data or census data). Secondly, some are open and freely available (such as a transport authority's traffic pattern data). Thirdly, some are owned by private companies, and some are publicly available but fractured across different public entities. Lastly, there are the private data of individuals themselves (including what is managed by the services they use). For example, with more open data, the public and third party developers can put them to good use in creating people-centric infrastructure solutions.

Key points:

Open data

Many governments are now seeking to encourage greater private participation in infrastructure which requires owners and operators to gain access to government-procured and owned data. In some cases, governments have created a governance framework where individuals are given access to data on a case-by-case basis. Similarly, private organisations and individuals can request access to certain data sets but only when the purpose and scope of access and use of the data are clear to the authorities in charge of the data. Others have gone further by making their data sets widely available.

For example, open data from Transport for London is freely released for developers to use in their own software and services. It also comes with guidelines which include technical information to help users understand how the open data works and how to use it correctly. By providing open data to developers, studies have shown that Transport for London has improved journeys, saving people time, supporting innovation and creating jobs.

6 Land Transport Authority website. *Connect (publication by Land Transport Authority).* www.lta.gov.sg/ 2019

7 The EZ-link card is a contactless multi-purpose stored value card that is mainly used for transit payments on public transport, such as buses, the mass rapid transit (MRT) and light rail transit (LRT) networks in Singapore. It is also used for non-transit purposes, such as making payments at retail shops and for Electronic Road Pricing (ERP).

Adapting to the trend

It is important for governments to be in the driving seat of encouraging and facilitating data and analytics within the infrastructure sector, particularly with respect to planning. In part, this will require governments to start systematically collecting, curating, and opening up their data so that infrastructure asset owners, operators, and the public can uncover more valuable insights. Economies that operate within robust, flexible frameworks and broad social agreements on data usage would be well positioned to take advantage of the new emerging technologies. Once that data can be freely shared across multiple platforms in a transparent way, the benefits of analysis would drive innovation of new models for how infrastructure is planned and operated. This practice has already been implemented in some AMS. For example, the Malaysian government established the MyGDX data sharing platform[8] that provides data brokerage services for common data referred by government agencies. This enables information to be coordinated and sharing across agencies more efficiently, leading to a reduction in cost of infrastructure. In addition, the MyGDX ensures that the shared information is accurate and consistent from a single source of truth (SSOT)[9], and at the same time reduces the overlapping development, operation and maintenance of multiple data sharing platforms.

2.4. Trend 4: Technology - opportunities and risks

In many sectors, particularly in energy and transport, technology has fundamentally changed how infrastructure owners and providers plan, design, develop and operate. The impact of technology is going to continue broadening from the discovery and application of new technologies, new uses for existing technologies and increased collaboration between asset owners, operators and consumers. As highlighted in Trend 3 (Embracing data sharing), infrastructure owners and operators will move towards sharing data as they strive to achieve greater efficiency and value from their investments. While new technologies bring a wide range of opportunities for infrastructure, investors are growingly concerned about the rapid pace of technological change as infrastructure projects have large capital requirements and long gestation periods. The focus is now on constantly assessing the risk and devising mitigation strategies in case their investments become technologically obsolete before the end of their anticipated operational lifecycle.

Key points:

Opportunity

Adopting automation tools allows infrastructure operators to eliminate human error and enhance performance. Connecting users with real time infrastructure information (e.g. through mobile applications) will allow customers to control their infrastructure usage and influence the use of alternatives. Similarly, by adopting new technologies and creating encouraging environments for them, developing countries may leapfrog the mature markets with old infrastructure networks. The competition around new technologies will continue to intensify as players look for new opportunities to improve their services, products and revenues. Consequently, this will mean that governments have a chance in delivering infrastructure at an overall lower whole of life cost with newer technologies.

8 MyGDX website, https://mygdx.malaysia.gov.my/en#, 2019

9 The single source of truth (SSOT): this concept is used in information systems design and theory and not to be taken figuratively.

Risk

New ideas in the technology environment are also not often confined to one geography or sector. Infrastructure owners and operators are starting to appreciate the importance of the broader understanding, assessing and adopting new technologies. With little experience of forecasting technology trends, infrastructure planners and investors will likely continue to struggle with the longer-term challenge of understanding consumer behaviour and demand in an ever-changing technology environment if they do not start investing in the tools and capability. This can often result in "obsolescence risk" which is the risk that a component, or technology used as part of the technical solutioning of the infrastructure becomes obsolete, and thus no longer supported in the marketplace after a period of time[10].

Adapting to the trend

Governments with little success in taking technological change into account may risk falling behind in advancing their country's overall productivity. It is important that infrastructure owners and operators (including private owners and operators) start focusing on developing robust technology plans, balancing the need for having resilient infrastructure against the desire to deliver the service with the cheapest option. This would require governments to invest in appropriate technologies, building up capability to use them, and focus on staying at the forefront of technological innovations. AMS have already started responding to this trend and considering technology as part of its national policy. For example, under Malaysia's recent National Transport Policy 2019–2030[11], Policy Thrust 2 aims to optimise, build and maintain the use of transport infrastructure, services and network by implementing smarter and more efficient use of existing infrastructure and developing new infrastructure through the adoption of technology and digitalisation in transport. This will achieve the aim of optimising resources, reducing wastages and increasing productivity in existing transport infrastructure. Similarly, Brunei Darussalam's Land Transport White Paper[12] issued in 2014 highlighted the need to prescribe technology implementation on a policy level in areas of communication, environment and conservation and transport (Transport Demand Management, Intelligent Transport Systems).

2.5. Trend 5: Adopting alternative financing structures

Traditionally, financing for infrastructure in ASEAN has been dominated by public sector funding, such as direct government budgetary funding, official development assistance, or other concessionary loans at the sovereign level. While private sector financing is no stranger to power and telecommunications transactions in the region, many other sectors are still lacking a pipeline of bankable projects with a viable risk allocation. With limited funds, governments are struggling to decide how to pay for the assets and services that must be delivered.

10 Obsolescence risk is also further discussed in Trend 6 (Getting more out of existing assets) and Trend 7 (Factoring resilience in infrastructure investments) in this chapter.

11 Ministry of Transport Malaysia. National Transport Policy 2019 – 2030, https://www.pmo.gov.my/wp-content/uploads/2019/10/National-Transport-Policy-2019_2030EN.pdf

12 Ministry of Communication, Brunei Darussalam, Land Transport White Paper, http://www.post.gov.bn/Documents/Land%20Transport%20White%20Paper/Land%20Transport%20White%20Paper%20for%20Brunei%20Darussalam%20-%20FINAL%20VERSION.pdf, 2014

There are many ways to develop infrastructure projects and there is no one-size-fits-all model. The governments of developing countries in ASEAN recognise the importance of introducing private sector investment in infrastructure, such as through public-private partnerships (PPPs), in a way that allows for the unique characteristics of each AMS. Therefore, AMS are developing their own distinctive models for procuring new infrastructure, instead of simply lifting and adapting the PPP models from countries such as the UK, Australia and Canada. We have further explored three categories here – (1) blended public and private financing models, (2) unsolicited proposal models, and (3) land value capture concepts.

Key points:

Blended public and private financing models

Official development assistance (ODA) and other forms of government-to-government (G2G) support have long played an important role in funding infrastructure in developing countries in ASEAN and continue to do so. Although the region's huge infrastructure needs have attracted significant assistance from multilateral banks, it is still insufficient. Today, there is increasing use of a blend of ODA and G2G financing alongside private financing to procure new infrastructure projects and alternative models are being explored to secure lower cost financing while retaining traditional benefit of "whole of life" through contractual design. Governments themselves have also sought to put in place the necessary legal regimes and programmes to encourage greater levels of private finance and investment, such as the formalisation of supporting institutions and mechanisms such as the Indonesia Infrastructure Guarantee Fund[13].

Unsolicited proposals models

In some markets, unsolicited proposals from the private sector for projects that are fully privately financed are strongly encouraged. Although a number of major unsolicited proposals remain under consideration by the government, these have been slow to progress. The Swiss Challenge has the potential to lengthen the process and evidence has shown such mechanisms struggle to attract competing bidders during the procurement process. Consequently, countries could learn to better regulate unsolicited proposals to ensure that only bankable projects that are economically and commercially viable are considered. It is important that the private sector becomes aware of the new regulatory expectations concerning unsolicited proposals that require greater scrutiny and competitive bidding.

Land value capture

In other markets, some are trying to leverage land values to fund the gap. As public investments in transport infrastructure generate value for nearby property owners, governments are exploring the potential of value capture tools such as special assessments and taxes, tax increment financing, various forms of developer contributions, and joint development or other public sector real estate transactions. Others may consider PPPs in transit-oriented development. Land value capture is increasingly being considered as one potential source that can be tapped to provide funding for transportation projects.

13 The Indonesia Infrastructure Guarantee Fund (IIGF) is an independent State Owned Enterprise (SOE) of the Government of Indonesia (GOI). IIGF was established in December 2009 under Government Regulation No. 35/2009 to be the sole institution — or the "single window" — for appraising, structuring, processing claim payment and providing government guarantees for infrastructure PPP projects in Indonesia.

Adapting to the trend

The increasing adoption of alternative structures to fund projects will undoubtedly attract a wider pool of financing. The structuring of blended financing and PPP models may just increase the pipeline of bankable projects. The more frequent adoption of a viable revenue risk allocation is also a positive sign that sponsors, financiers and governments are reaching a common understanding much needed to accelerate infrastructure development. AMS are taking steps to adapt to this trend. For example, in 2018, the Myanmar government initiated the development of the Project Bank[14], of which main purpose is to ensure that the potential projects are aligned with the Myanmar government's vision and to find sources of financing. Project Bank initiative allows five modalities of project development and financing, including:

- with the government's budget;
- with Development Assistance;
- in partnership with the private sector through PPP mechanisms, including through unsolicited proposals,
- through plans to transfer state-owned economic enterprises to the private sector through equitisation
- through a blended mechanism of above modalities.

The form of PPP contract is also flexible and may be based upon project structures ranging from Availability Payments to Design-Build-Finance-Operate-Transfer (DBFOT). Projects identified under different modalities of financing are overseen by the respective agencies in charge.

2.6. Trend 6: Getting more out of existing assets

The shift in social norms and work patterns are reshaping demand as people start to work remotely and change how they interact with infrastructure to suit the way they live. As users get more (and timelier) data and information on their infrastructure, they will increasingly be able to adjust and change their usage patterns and behaviours. This may ultimately make some infrastructure obsolete if these social norms and work patterns are not monitored closely or not considered in the business cases for future infrastructure projects. In developing countries both globally and in ASEAN, the challenge continues to revolve around the need for basic infrastructure to improve capacity. In the mature markets, infrastructure owners turn their focus to making smaller investments that unlock improved performance, capacity, reliability and service delivery. Demand management and capacity enhancements are strategies being adopted to better utilise infrastructure without the burden on excessively huge capital spend.

14 Office of the President. Republic of the Union of Myanmar. Notification No. 2 /2018, Project Bank Notification, paragraph 4, https://www.amchammyanmar.com/asp/view_doc.asp?DocCID=5377, 2018

Key points:

Demand management

With the increasing demand for infrastructure but limited public funds, governments around the world are thinking about how they might get more from their existing infrastructures. Consequently, governments are investing towards demand management. Much of existing infrastructure are designed to meet peak demand. Today, rather than building entirely new capacity to meet ever-higher peaks, governments at all levels are starting to think about ways to smooth out the peaks.

Capacity enhancements

At the same time, infrastructure owners are looking for opportunities where incremental investments can deliver significant capacity enhancements. This is sometimes limited to flexibility designed into the infrastructure system[15]. For example, upgrading the signalling in the rail system allows trains to run closer together, therefore enabling more passengers to be moved in shorter period of time.

Adapting to the trend

With the rapid pace of technological change, infrastructure systems are also becoming more sophisticated. By adopting new technologies, infrastructure owners will have the increased ability to get more out of the existing assets by, among others, adjusting pricing to manage demand and more finely calibrate their operations. Additionally, governments can implement schemes (e.g. staggered work days, time-of-day billing, pricing incentives) and regulatory measures to incentivise behaviours that help better manage peak demand in various sectors, particularly in congested urban areas. In some AMS, steps have already been taken to improve usage of existing assets without adding capacity. As an example, in Singapore, price incentives have been implemented to ease the ridership load during peak hours. LTA's Travel Smart Reward (TSR) initiative aimed to redistribute peak hour travel demand by allowing commuters to earn points and rewards when they travel outside the morning peak period[16]. The initiative resulted in a 12 percent increase in commuters travelling during the morning pre-peak period in 2018. This increase was significantly larger than the overall ridership growth of two percent, suggesting that LTA's demand management approach through incentives was effective.

2.7. Trend 7: Factoring resilience in infrastructure investments

Technology, social norms, demographic trends, economies, environmental, climate and customer expectations are rapidly changing. Traditionally, infrastructure planners and developers design assets with long lifespan expectations (e.g. beyond 50 years), assuming that fixed technology will remain for the foreseeable future. Infrastructure has historically been built based on

15 Further details elaborated in Trend 7 (Factoring resilience in infrastructure investments).

16 Channel News Asia, *Train commuters to be given incentives for using other modes of public transport in congested areas: LTA*, https://www.channelnewsasia.com/news/singapore/commuters-incentives-other-public-transport-train-congestion-11517626, 2019

today's needs, social norms, demographic trends and customer expectations, not what they might be when the asset comes into operation.

Multiple disasters in recent years have also demonstrated the significant socio-economic and environmental impacts of shock events. When access to reliable electricity, communications, and mobility (services that critical infrastructure systems provide) is cut off for extended periods, movement of labour and inventory is impaired, and the economic consequence is often large. Today, the focus is turned to building resilient infrastructure systems which are resistant or adaptive to disruptive events.

Firstly, resilience can be improved by building in flexibility into infrastructure. Secondly, the resilience quality may also be achieved by having supportive regulatory frameworks to allow reserve capacity or back-up systems to reduce the risk of service delivery failure or prolonged periods of disruption. Thirdly, resilience can be enhanced by incentivising the private sector to play an active role in finding innovative ways to maintain and improve the asset across its lifecycle.

Key points:

Flexibility

Designing flexibility into infrastructure usually comes at a higher upfront capital cost. However, the value comes in choosing an option that offers greater future flexibility to avoid a potentially obsolete design. This could reduce the risk of spending more in the future. For example, having a modular approach in design may increase the flexibility of the system, mitigating the impacts of obsolete components making up that system. This means planners and owners take more risks, in the hope that future innovations will bring about longer-term benefits.

Regulatory governance

Having reserve capacity, back-up systems or future-proofing capacity undoubtedly associate with higher project costs. Without absolute certainty in what the future may bring, planners and designers will need to consider multiple scenarios, identify the most likely and then build accordingly. This may mean constructing more capacity than is immediately needed. To achieve the above, appropriate regulatory frameworks will need to be in place to facilitate and promote such objectives and standards.

Private sector's role

If a large share of critical infrastructure is privately owned or operated, governments can partner with the private sector to build resilience through information sharing and potential cost sharing mechanisms. In addition, operators can be required to plan for resilience by formulating appropriate standards for business continuity and implementing them to manage risks to the operation and delivery of core services.

Adapting to the trend

To build resilient infrastructure systems, planners and designers will need to consider the long-run value of flexibility and build those assumptions into the business case. Flexibility should become a key design and contracting principle with the costs weighed against the longer-term benefits and an evaluation methodology to match. Establishing a governance framework that ensures resilience measures are applied to multiple

critical infrastructure sectors is essential. This is due to the functional dependencies and interdependencies between different sectors of critical infrastructure. Governments should also consider complementary governance approaches to regulation, which include those that foster regular exchanges, information sharing, mutual trust, and public cost sharing for private investment in critical infrastructure resilience.

AMS have started considering the need for infrastructure to be resilient to climate change, weather, seismic conditions, population growth and other factors. For instance, specific steps have been taken in Thailand where its capital Bangkok is a flood-prone metropolis that is home to ten million people. It has become part of the 100 Resilient Cities Initiative and has released its Resilience Strategy in February 2017. Under the Goal 4 of the strategy (Improving Resilience to Floods), the country plans a range of programmes and activities aiming to improve infrastructure resilience, among which are revision of design criteria for drainage, development of drainage tunnels, improvement of major canals and feasibility assessment of Flood Resilience Index (FRI).

2.8. Trend 8: Consulting the customer

The underlying parameters of infrastructure planning have changed. The traditional assumptions like bigger populations require more roads, bigger generation capacity and more transit, 'fixed' technology solution and 'fixed' consumer behaviour also need to change. New technologies and approaches are allowing infrastructure planners and owners to uncover new insights about user patterns and expectations. Customer demand for real-time information and insights indicates that access to data is quickly becoming just as important to customers as access to physical services. Today, technologies are being used to digitise the infrastructure experience. Therefore, access to peripheral services and retail options have to be invested in, not at the expense of the core service's performance. Infrastructure strategies and sector master plans will need to be informed by real-time and predictive customer insights rather than historical patterns and expert opinion. Firstly, planners will have to understand the target customer preferences and gather supporting relevant data which will underpin these predictive insights.

Key point:

Understanding preferences and data

In some mature markets, people are ceasing to see the needs to own cars. The end to end journey time is important and can be also be achieved by shared use of private vehicles. The use of real-time traffic and navigation apps determines their route through a city. Environmental impact influences their transportation decisions as much as cost and convenience. In other developing countries, this trend is playing out somewhat differently. In ASEAN, rising affluence and a rapidly expanding middle class have led to massive demand for air travel and increased private car ownership. Cities are also being shaped by disruptive technology. Disrupters such as blockchain, sharing economy, open data and autonomous vehicles would change the way things are done and why and the need for people to move around.

Adapting to the trend

While the population will always want to have a larger say in their infrastructure options, governments will need to focus more clearly on understanding actual user choice. This means taking the time to understand the changing demands of both current users and future generations to help shape their infrastructure strategies. For example, the Singapore Government's feedback unit REACH[17] is the lead agency in facilitating whole-of-government efforts to engage and connect with Singapore citizens on national and social issues. The platform encourages Singaporeans to get involved in shaping Singapore's public policies, including those that concern infrastructure. The feedback consolidated by the platform via both traditional and online feedback channels is directed to the respective agency that is of concern. Another example can be seen in Malaysia where this trend was addressed with the aid of modern technology[18]. Selangor citizens can report on road potholes via mobile application, and the information is being sent to the local council and officer in charge. The authority is then responsible for addressing the problem within a specified number of days[19]. This provides an example when the infrastructure users become active participants of shaping and improving the infrastructure. As a result, problems are identified and addressed in a quicker manner, and the end user experience is improved.

2.9. Trend 9: Maturing regulatory design

Infrastructure projects and their approval processes often involve many policy areas, several layers of legislation and regulation, and different levels of government. The regulatory framework which sets the technical, legal and commercial parameters has significant influence on infrastructure investment, development, maintenance and upgrading of assets. Regulatory frameworks are often tailored to a particular sector and market. Robust regulatory regimes in mature economies are seen to provide certainty in the parameters and encourage the willingness to invest. In ASEAN, the maturing of investment laws, public procurement laws, privatisation and concession laws, environmental protection laws, and sectoral regulations are positively impacting private participation in infrastructure projects. While regulators are seldom involved in market structure decisions, they are expected to guide and supervise the implementation of significant policy changes that affect infrastructure. These policies could cover safety, performance, asset stewardship, deregulation, unbundling, privatisation or user-charge regulation. Accordingly, a good regulatory design and delivery is necessary to ensure sustainable and affordable infrastructure over the life of the asset, inclusive of both the (1) planning and (2) operations phases.

17 Reaching Everyone for Active Citizenry @ Home, https://www.reach.gov.sg/, 2019

18 See Adapting to the trend under Trend 4 (Technologies – Opportunities and risks).

19 The Star Online. *New way to get holes patched.* https://www.thestar.com.my/metro/metro-news/2017/11/21/new-way-to-get-holes-patched-motorists-can-effectively-use-navigation-apps-to-highlight-potholes-and, 2017

Key points:

Planning

Regulation is vital to the broader infrastructure investment regime. Regulators can bring to the table a consolidated economic or functional view of the sector or a given project, that is if coordination mechanisms[20] are in place to facilitate agencies coming together. Regulations should set out clearly that planning for an infrastructure project requires a justified business case, when its economic, social and environmental benefits outweigh the costs, and net benefits are maximised. High level analyses should also cover the project structuring options to provide some certainty with regards to revenue flows (user charges) and sources of funding (budget subsidies) through the lifecycle of the asset. If the uncertainty is too large, it can result in a lack of confidence in the project's affordability from both public sector and potential investors, and ultimately affects value for money and the quality of service delivery.

Operations

Regulation can influence the collection and use of robust data in evidence-based planning[21] and enhancing productivity of existing assets[22]. The lack of data collection and availability impedes systematic post implementation learning, although some audit processes are addressing this gap. However, as infrastructure systems get larger and more complicated, this means more dedicated resources and tools as audit teams get larger and processes get longer, but feedback may not be timely. To enhance productivity, transparency, confidence and value for money, regulation can be put in place for public and private operators to disclose key data in a timely and manageable way. Major infrastructure projects can be monitored in terms of project budget, project timeline, performance, finance and compliance.

Adapting to the trend

The design and implementation of the rules are equally important, and so are putting in place adequate governance arrangements, overseeing the steps taken to achieve the expected economic, social, and environmental goals. Coherence in policy, legislation and regulation, and good coordination between government authorities in their implementation, will simplify project development and implementation by reducing the administrative burden. A stable regulatory environment is often associated with a regulator that is perceived as taking decisions on an objective, impartial, and consistent basis, without conflict of interest, bias or improper influence. This helps create an enabling environment for effective management of infrastructure.

Countries across ASEAN take steps towards designing comprehensive infrastructure-related regulation, however developing coherent legislation which would help to spur economic development and investment activities is challenging. As an example, the Government of Viet Nam introduced Decree 15 that provided a single legal framework for private investment in public infrastructure sectors, which was later replaced by Decree 63 in 2018. However, those legislative papers did not support PPP project development as expected. In order to address the issues, the PPP legal and regulatory frameworks have been comprehensively reviewed. As a result, a new Law on PPP Investment was drafted, which aims to address issues faced with Decree 63 and other relevant PPP regulations[23].

20 See Trend 1 (Accelerated pace of infrastructure development).

21 See Trend 2 (Increased reliance in robust and verified data).

22 See Trend 6 (Getting more out of existing assets).

23 Vietnam Investment Review, *Latest draft Law on PPP sees positive changes,* https://www.vir.com.vn/latest-draft-law-on-ppp-sees-positive-changes-70177.html, 2019

2.10. Trend 10: Sector capacity building

Improving infrastructure is fundamental to spurring economic transformation and enhancing national productivity, much needed by developing countries, both globally and in ASEAN. This needs to be facilitated by strong partnership and capacity enhancement within these developing countries. However, the long-term and complex nature of infrastructure projects can make it difficult to oversee the performance of infrastructure service delivery and maintain value for money through the performance of the asset. As such, this calls for the need to place emphasis on bridging knowledge gaps and uplift capabilities in project development, financing and implementation. Getting the right expertise is particularly important in the development of an infrastructure that is fit for purpose. Effective and efficient contract management is equally important when the infrastructure is operational and there are multiple contractual interfaces between the public and private sector.

Key points:

Expertise

In some developing countries, it is a challenge attracting international experts and sub-segment champions amongst developers, professional services and technical and financing solutions to meet the specific needs of each project. Some have responded by skill-enhancing sectoral units, regulators, and streamlined the role and availability of specialised advisors. Others have set up dedicated units, especially in the field of PPPs, which are contract based, but increasingly with a broader remit of infrastructure in general. Some leverage the required expertise from centre of excellence set up in neighbouring countries. However, in the long term, the responsibility for identifying potential problems during the planning and operational phases of the project rests primarily with the line ministry or agency.

Contract Management

It is necessary for central agencies and regulatory authorities to have sufficient oversight and retain the appropriate level of responsibility during the operational phase. Particular attention should be paid to contractual arrangements and monitoring capacity at later stages of a project so as to ensure that incentives do not deteriorate. Proper contract management, monitoring clear performance metrics and capacity building objectives are important throughout the asset lifecycle and could be facilitated through regulations and policies.

Central agencies and regulatory authorities have to also be prepared to adopt innovative contracting approaches to address the legal and commercial issues unique to each market[24]. Managing the changing environment and emerging risks through amending and adapting contracts is key to de-stressing projects. While various countries may have different views on renegotiations, the experience from mature markets is to allow certain flexibility for minor changes to long-term and complex contracts such as PPPs. As such, governments have to be equipped with necessary contract management skills in negotiation with the private sector to ensure that value for money is maintained.

24 See Trend 5 (Adopting alternative financing structures).

Adapting to the trend

To fully maximise sector capacity development, markets should have a clear and robust capacity building framework in place. It is important that governments assess the readiness for undertaking major capital projects as the sectors evolve and examine resource constraints in the local and regional markets, and to re-evaluate and adapt the training agenda to build sector capacity and capability. Only with the right expertise and skills supporting the respective sectors and disciplines, sustainable infrastructure, good performance standards and value for money objectives can then be achieved together throughout the asset lifecycle. In some AMS, this trend is being addressed in a structured manner. For instance, the Greater Mekong Subregion (GMS) Programme[25] comprises Cambodia, Lao PDR, Myanmar, Thailand, Viet Nam and two provinces of the People's Republic of China. One of the main focuses of the GMS Programme is to improve connectivity in the subregion through strengthening linkages in transport, energy, and telecommunications. The GMS Programme provides assistance to the facilitation of cross-border transport of goods and people in GMS. It also aids the implementation of high priority projects on regional public goods as well as in various other sectors.

The GMS Programme is owned by GMS countries and has maintained ADB in the secretariat role. The five strategic thrusts[26] are supported by seven implementation arrangements:

- Resource mobilisation
- Knowledge platform
- Strategic alliances and partnerships
- Capacity building
- Engagement with the private sector and other stakeholders
- Monitoring and evaluation
- Evolution of sector forums and working groups

25 Asia Regional Integration Center, https://aric.adb.org

26 (1) Strengthening Infrastructure Linkages (2) Facilitating Cross-Border Trade, Investment and Tourism (3) Enhancing Private Sector Participation and Competitiveness (4) Developing Human Resources (5) Protecting the Environment and Promoting Sustainable Use of Shared Natural Resources.

3. Stocktake of Existing Frameworks

3. Stocktake of Existing Frameworks

Infrastructure productivity and performance frameworks around the world and existing practices for monitoring and improving productivity in AMS are equally important sources of reference for developing a robust infrastructure productivity framework in ASEAN. This Chapter, consisting of three parts, aims to highlight some of the globally-regarded frameworks relevant to ASEAN and initiatives in ASEAN.

Part one studies existing infrastructure productivity and performance frameworks around the world, namely Australia, UK, New Zealand and the US. These countries are some of the world's most innovative leaders in infrastructure planning, financing, and delivery, benefitting from past reforms to the selection, procurement and regulation of infrastructure assets, and the creation of sophisticated and mature infrastructure markets.

Part two explores the existing initiatives for improving infrastructure productivity in ASEAN (in the absence of developed productivity and performance frameworks).

Part three includes the findings of the consultation process with government stakeholders in each AMS on existing frameworks, measures and diagnostics currently in place.

Understanding underlying concepts and approaches behind existing frameworks is important when leveraging on best measures. This helps to bring attention to key concepts that future frameworks could focus on and learning from the barriers that had affected implementation of existing frameworks. Despite identifying several infrastructure productivity and performance frameworks, observations suggest that infrastructure productivity is still an emerging theme across both developed and developing markets.

3.1. Global infrastructure productivity and performance frameworks

Developed economies with a long history of expertise in infrastructure prove to be a useful source of reference for developing a robust infrastructure productivity framework. The case studies highlighted here seek to understand the users of existing frameworks, how it feeds into their work and the relevant infrastructure productivity measures utilised to assess performance. The six frameworks studied include:

- Infrastructure Performance Indicator Framework Development (New Zealand)
- Australian Transport Assessment and Planning Guidelines: T4 Productivity Metrics (Australia)
- Benefit Management Framework 2016 (Australia)
- National Infrastructure Commission: Performance Measures (UK)
- National Infrastructure Commission: Measuring Infrastructure Performance Technical Appendix (UK)
- Florida Department of Transportation: Performance Framework and Report (US)

A summary of the global studies is outlined below.[27]

Table 1: Global case studies in infrastructure productivity and performance frameworks

Case Study	Summary
Infrastructure Performance Indicator Framework Development (New Zealand)	• Provides infrastructure performance indicators that can be used to help evaluate progress and efficiency against the National Infrastructure Plan's (NIP) objectives; • Promotes a set of indicators that could serve as a rigorous tool for assessment of infrastructure productivity. These indicators were derived based on the analysis of the role of existing data sets and indicators.
Australian Transport Assessment and Planning Guidelines: T4 Productivity Metrics (Australia)	• Outlines best practice for transport planning and assessment. • Provides practical guidance on (amongst others): developing goals, transport system objectives and targets, identifying, assessing and prioritising transport problems, prioritising proposed initiatives, programme development and reviewing performance.
Benefit Management Framework 2016 (Australia)	• Seeks to provide a consistent approach to identifying, monitoring and evaluating the success of VicRoads[28] investments. • Focuses on identifying clear links between indicators and outcomes to build productivity.
National Infrastructure Commission (NIC): Performance Measures (UK, 2017)	• Seeks to identify a set of quantitative performance measures to establish an understanding of the current status, efficiency and shortcomings of the UK's existing infrastructure assets. • Covers six sectors namely digital communications, energy, flood risk management, solid waste, transport, water and wastewater sectors.
National Infrastructure Commission (NIC): Measuring Infrastructure Performance Technical Appendix (UK)	• Assesses the quality of the UK's infrastructure services and compares different infrastructure systems. • Provides details on the consultation responses received and serves as an extension of the performance measurement framework published in 2017
Florida Department of Transportation: Performance Framework and Report (US)	• Provides a high-level overview of infrastructure performance and how it is driven by rigorous infrastructure productivity measures. • Focuses on the transport sector but provides an integrated approach to understanding the sector productivity.

27 Refer to Annex B (Further Details on Global Infrastructure Productivity and Performance Frameworks) for more information on each global case study.

28 VicRoads is Australia's local government agency that owns, manages and regulates the arterial road network, delivers road safety initiatives, and provides customer focused registration and licensing services in the State of Victoria (2018). https://www.vicroads.vic.gov.au/

The global frameworks reviewed have focussed more towards the transport sector however other infrastructure sectors have also been covered such as telecommunications, energy and water sectors.

The frameworks seek to provide means of measuring infrastructure productivity through the development of relevant indicators that measure infrastructure performance. These frameworks also emphasise the importance of aligning indicators, outcomes and measurements to their respective national infrastructure plans in adopting a consistent approach across all government sectors. On a holistic level, key observations across the frameworks were taken forward for consideration in the development of the Framework for Improving ASEAN Infrastructure Productivity.

3.2. Existing initiatives for improving infrastructure productivity in ASEAN

AMS have taken steps towards improving infrastructure productivity in various ways. Three examples are highlighted below.

1. Infrastructure Asia is an initiative by Enterprise Singapore and the Monetary Authority of Singapore that aims to support Asia's economic and social growth through infrastructure development. Infrastructure Asia leverages its network of partners to catalyse projects getting support for regional infrastructure needs through:
    - Knowledge and practice sharing – access to necessary expertise and knowledge[29] to make better informed decisions in the analysis and project selection process.
    - Financing solutions – access to global and Singapore-based banks which are able to provide tailored project financing solutions to individual project needs

2. Various multilateral development banks, including ADB and World Bank, along with other development organisations, are also often involved with capacity building and providing project development support for infrastructure projects in various AMS. While these initiatives may not always be on-going, they often cover important factors contributing to infrastructure productivity such as:
    - Promoting the formulation of a priority list of projects
    - Supporting initiatives designed to increase effective capacity of infrastructure
    - Providing technical experts to undertake feasibility studies, cost-benefit analyses, capacity building and engineering designs on important infrastructure projects
    - Implementing efficient, effective and accountable project management for governments' infrastructure projects
    - Build a more supportive regulatory and policy environment for infrastructure investment, where new policies and master plan implementation is being supported

29 This includes partnering with multilaterals, world-renowned developers and advisors with strong expertise in areas such as project structuring, engineering, legal, management, financing and investment.

3. Apart from regional initiatives, AMS have also taken steps in national initiatives[30]. Examples include Myanmar's Project Bank initiative[31] and Singapore's TSR[32] initiative for peak demand management[33].

3.3. Consultation Findings

In developing the Framework, a consultation process was undertaken to engage with government stakeholders in each AMS. The objective of the consultation process was to understand any existing frameworks, measures and diagnostics currently in place. It was also an opportunity to engage with central coordinating agencies and project implementing departments to discuss the kinds of tools or actions that would be effective in improving productivity.

The findings from the consultations are set out below.

Finding 1 – Long Term National Infrastructure Strategies

Across all AMS, there exists a long-term national infrastructure strategy or master plan which drives the planning and development processes. The national plans include a number of priority areas including but not limited to:

- Vision and Mission
- National KPIs
- Trends and challenges
- Key priority areas for economic development including specific infrastructure sectors;
- Implementation plan for any new or existing initiatives
- National performance assessment

Sector agencies are involved in varying degrees in the development of the National Infrastructure Strategy, providing sector specific input and data to ensure the strategies focus on the key development and priority areas.

Finding 2 – Autonomy of sector agencies in developing and implementing sector master plans

In the development of the sector master plans, sector agencies within each AMS typically develop their own sector master plans to align with the overall National Infrastructure Strategy. These sector master plans are typically approved by central government. Implementation of the sector master plans is then typically the responsibility of the sector agency and central government is not always involved in further decision making. A continued role for a "central coordinating agency" could be an effective means of maintaining focus on the National Infrastructure Strategy and for ensuring effective coordination between sectors.

Finding 3 – Challenges faced in collecting data

30 Refer to Chapter 3 (Key Trends) for more examples of national initiatives across ASEAN.

31 See Adapting to the trend under Trend 5 (Adopting alternative financing structure) and footnote 15.

32 Land Transport Authority (Singapore), https://www.travelsmartrewards.lta.gov.sg

33 See Adapting to the trend under Trend 6 (Getting more out of existing assets) and footnote 17.

Within each AMS, sector agencies are generally responsible for collecting their own respective data on the performance and utilisation of their infrastructure assets. They set their own data requirements and devise their own systems for collecting data in order to meet their needs. The extent of systematic data collection varies between AMS; some have systems and procedures for regularly updating their databases, others collect data on an as-needs basis to support feasibility studies for new projects; some depend more on regional governments to collect and maintain data, and some make use of third-party infrastructure operators.

Some relevant problems identified during the consultation include:

- Data is not collected regularly so there is a risk of having decisions be made based on outdated data
- Data on condition of assets is rarely collected or monitored
- Different agencies may be using different datasets which are not always aligned
- Data collection can be a resource intensive activity

Finding 4 – Outcome-based targets for infrastructure planning

Some AMS are setting outcome-based targets for their line ministries, and line ministries setting similar targets for their implementing departments. This is a positive step since infrastructure projects should be identified and planned to meet stated desired outcomes. Difficulties arise however when outcomes depend on the coordinated activities of different departments and ministries, or on the behaviours of the private sector or the public. Ministries and their implementing departments could sense that the target is outside of their control and therefore not a suitable metric against which they should be measured.

Finding 5 – Challenges of consulting multiple stakeholders

AMS consulting multiple stakeholders and various levels of government across the entire infrastructure project lifecycle. This ensures comprehensive feedback is obtained and informed decisions are made by the respective agencies and AMS. However, with more multiple stakeholders involved, AMS are facing challenges due to additional personnel and time required to plan, coordinate and obtain approval (including collecting data). Delays in the approval process due to many rounds of approvals can hinder project delivery.

Finding 6 – Increasing number of unsolicited proposals

There is an increasing growth in the number of unsolicited proposals received by AMS across all infrastructure sectors. This provides an additional avenue for AMS to develop new projects and improve existing assets. However, AMS have identified a number of challenges with this trend:

- Inconsistency in the quality of the proposals received – largely due to the skill set and quality of the advisors and uncertainty by the private sector on what the government is seeking
- Although the proposals may be financially beneficial for the AMS, they may not consider the wider public benefits

- Individual projects (proposed) do not consider the wider infrastructure environment e.g. an unsolicited proposal for an airport project may not consider how to optimise the road network to the airport
- Lack of resources to adequately evaluate the proposals

Finding 7 – Connectivity is a focus for AMS

AMS have identified the importance of connectivity, between one or more AMS or within their own country. Opportunities for increased connectivity exist via land, air and maritime and through the sharing of experiences / knowledge. Physical connectivity (through cross border projects) is identified by AMSs as pivotal for regional growth, especially amongst AMS who share physical borders. As such, AMS are working more and more collectively to develop cross border projects despite challenges faced due to different legal, regulatory and funding systems between the AMS.

Finding 8 – Funding certainty for projects

A common theme observed through consultation, and corroborated by market sentiment, is that long term projects that span more than one budget cycle or government tenure face uncertainty of funding, and therefore there is a risk that projects may be started but then halted as funding for completing the project is not made available. It is also observed that the incumbent AMS officials may be unable to commit future administrations to the completion of some projects.

Finding 9 – Funding for asset maintenance activities

Some AMS stated that including sufficient funding within their annual budgets for asset maintenance activities was challenging. There are examples of dedicated funding sources, however often maintenance is not prioritised by government agencies.

Finding 10 – Project Risks

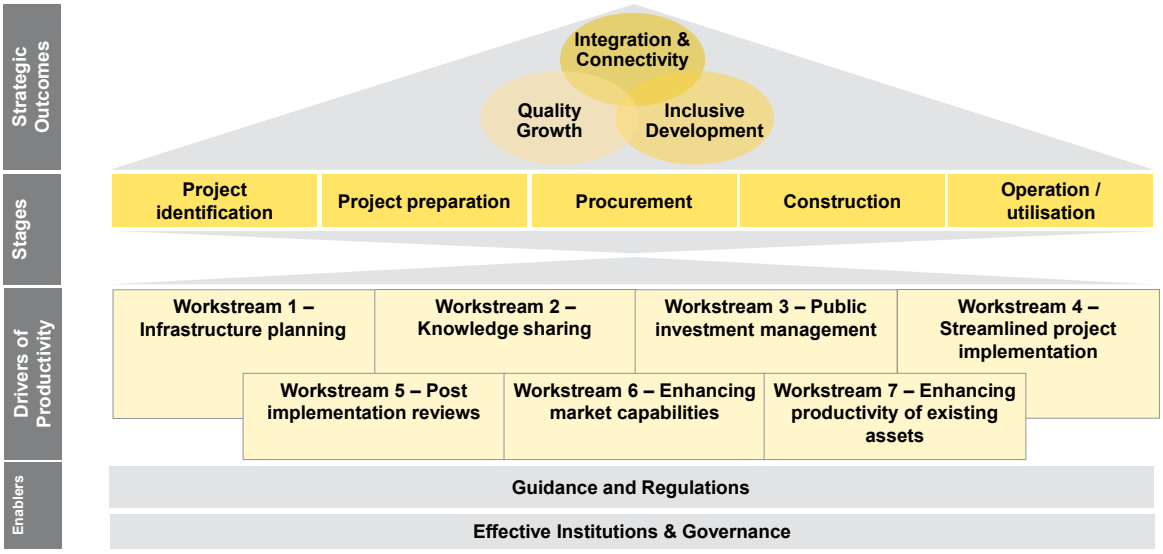
When asked about the risks that are most likely to cause delay to project implementation and completion, many AMS commented that land acquisition and resettlement requirements presented the greatest risks. Many projects have faced significant delays and escalating costs as a result of land issues.

4. Infrastructure Productivity Framework Workstreams

4. Infrastructure Productivity Framework Workstreams

This chapter outlines the proposed Framework for Improving ASEAN Infrastructure Productivity. Covering all stages of a project's lifecycle, the Framework details the recommendations for workstreams and suggested priority actions. Figure 1 below presents the Framework and its seven workstreams as drivers to achieve the strategic outcomes of quality growth, inclusive development and greater integration and connectivity in ASEAN[34]. For the Framework to be meaningful, a strong enabling environment, underpinned by a robust regulatory framework and strong institutional and governance arrangements in developing and delivering infrastructure projects, would be key to ensure the implementation of the seven workstreams effectively drive infrastructure productivity in ASEAN.

Figure 1: Framework for Improving ASEAN Infrastructure Productivity



Each workstream contains several recommended priority actions to support the implementation of each workstream[35]. The workstreams and their respective priority actions recommended in this chapter have been shortlisted to address the key trends identified[36] and the key findings from the AMS consultation process[37] and are not listed in order of priority. Whilst the priority actions under each of the seven workstreams can be undertaken individually, the impact of each priority action or workstream may be enhanced through coordinated activity in a number of workstreams which complement each other.

34 The three strategic outcomes (i.e quality growth, inclusive development and integration and connectivity) of the Framework identified are aligned to support the vision of ASEAN Connectivity 2025 to achieve a seamless and comprehensively connected and integrated ASEAN that will promote competitiveness, inclusiveness, and a greater sense of Community. "Quality Growth" is important to support ASEAN's sustainable economic growth with rapid and significant investment in infrastructure which could address socio-economic needs and have far-reaching benefits in the long-run. "Inclusive Development" is a key lever to maximise positive impact by taking a whole-of-society approach (i.e. gender equality and social inclusion) to decision-making process to ensure the infrastructure is fit-for-purpose. Physical, institutional and people-to-people linkages are cornerstones of "Integration & Connectivity" of ASEAN to achieve a more competitive inclusive and cohesive region, with infrastructure being the key driver of greater physical connectivity amongst and within each AMS.

35 Refer to Annex C (Details of Workstream Priority Actions) for more information on each Workstream and their Priority Actions.

36 See Chapter 3 (Key Trends).

37 See Chapter 4.3 (Consultation Findings).

4.1. Workstream 1: Infrastructure planning

Investment in infrastructure can drive sustainable economic growth when it is properly aligned with the country's vision and strategic priorities in national and regional settings. With governments under fiscal constraints, investments must be strategic in nature to maximise "value for money" for taxpayers and society. Fundamental to this is selecting and prioritising the right projects and coordinating infrastructure investment across sectors.

The objectives of this workstream and the priority actions are to:

- Encourage infrastructure planning that considers the bigger picture – the AMS' own vision and its role within the ASEAN region
- Plan infrastructure investment to achieve agreed outcomes
- Prioritise projects that provide optimal social and economic benefits for the AMS
- Coordinate the infrastructure planning and delivery activities across sectors

Common barriers to successful implementation:

- Decentralised responsibility for prioritising projects
- Lack of close communications between line ministries
- Different sectors' priorities are often aligned with the National Infrastructure Strategy, but not with each other

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 2: Workstream 1 priority actions

Workstream 1: Infrastructure Planning	
Priority Actions	**1A.** Map the infrastructure ecosystem
	1B. Improve inter-agency communication and coordination.
	1C. Define target outcomes for implementing agencies / line ministries
	1D. Build regional connectivity objectives into national infrastructure strategy and sector master plans
	1E. Prioritise infrastructure planning with interdependencies which have a multiplier effect on the benefit
	1F. Engage stakeholders early on major projects
	1G. Develop a project screening, selection and prioritisation procedures
	1H. Establish rigorous policy and procedures for dealing with unsolicited proposals

4.2. Workstream 2: Knowledge sharing

Selection and prioritisation of projects that have the greatest productivity potential relies on data related to demographics, land use, vehicle movements and travel patterns, trade, and future investments. Data on the condition and performance of existing infrastructure assets helps asset managers to plan their maintenance activities and interventions. It is

important to invest resources in data gathering and establishing procedures for more efficient sharing of data to enable better infrastructure planning and decision making.

The objectives of this workstream and the priority actions are to:

- Enable better decisions throughout the infrastructure project lifecycle based on improved and consistent data sets.
- Improve the definition of the infrastructure need so that projects can be scoped and designed to better meet that need.
- Promote sharing of data between government agencies and (where relevant) between AMS

Common Barriers to successful implementation

- Data collection is on ad-hoc basis rather than being systematic
- Data is not shared between government agencies
- Governments may not have a complete picture of the condition and utilisation of their existing infrastructure networks
- Governments can feel the need to press ahead with projects before completing all the necessary studies
- There can be limited capacity and resources within agencies/ministries for gathering data

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 3: Workstream 2 priority actions

Workstream 2: Knowledge Sharing	
Priority Actions	**2A.** Understand customer preferences and trends
	2B. Promote systematic collection of data
	2C. Back up project proposals with current data and robust forecasts
	2D. Facilitate greater data sharing among government agencies and stakeholders
	2E. Collect project data during and after project implementation
	2F. Regular reporting by agencies on key metrics aligned with target outcomes

4.3. Workstream 3: Public investment management

Efficient public investment management practices can improve productivity through enabling the timely funding, delivery and maintenance of essential projects. Poor capital planning can lead to projects being halted mid-way through construction. Examples exist of projects being implemented successfully with the assistance of controls put in place by donor partners, but then the implementing agencies lack the fiscal rigor to allocate sufficient budget to maintain and manage the infrastructure.

The objectives of this workstream and the priority actions are to:

- Promote capital planning such that once an investment decision has been made, the successful implementation of that project is not impeded by lack of funding
- Promote contracting models that can provide greater certainty of cost and funding
- Encourage best practice for funding of maintenance activities

Common barriers to successful implementation:

- Short term budget cycles do not provide certainty of funding for long term projects
- Investment decisions are often made only on the initial investment cost without considering the on-going maintenance costs.
- Non-essential maintenance of infrastructure assets is considered low priority

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 4: Workstream 3 priority actions

Workstream 3: Public Investment Management	
Priority Actions	**3A.** Provide greater certainty of funding for infrastructure projects
	3B. Consider whole of life costs of an asset when making investment decisions
	3C. Promote budgeting for infrastructure maintenance
	3D. Promote use of PPP or Output and Performance Based Contracting

4.4. Workstream 4: Streamlined project implementation

Better contracting for infrastructure and oversight of project implementation can greatly enhance probability of achieving intended outcomes.

The objectives of this workstream and the priority actions are to:

- Enable government implementing agencies to deliver projects effectively and efficiently
- Build capability in engaging with the private sector as a partner to deliver strategic infrastructure

Common barriers to successful implementation:

- Poor contracting results in government agencies bearing the impact of cost overruns and delays
- Poor contract management can result in government agencies failing to enforce risk transfer provisions, and therefore accepting sub-standard work or bearing the impact of cost overruns.

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 5: Workstream 4 priority actions

Workstream 4: Streamlined project implementation	
Priority Actions	**4A.** Put in place plans for approvals and land acquisition early
	4B. Undertake the Environment and Social Impact Assessments early
	4C. Optimise the contracting structure
	4D. Set appropriate qualification and evaluation criteria for bidder selection
	4E. Enforce rigorous procedures for unsolicited proposals
	4F. Strengthen contract management capability

4.5. Workstream 5: Post implementation reviews

Formal procedures for capturing and disseminating the lessons learned on projects will accelerate the capacity (and competence) development of the central coordinating agency and implementing agencies.

The objectives of this workstream and the priority actions are to:

- Create a framework for assessing and learning from experiences on previous projects
- Implement changes in future projects based on lessons learned

Common barriers to successful implementation:

- Lack of resources and willingness to review completed projects
- No formal channels through which to feed back the lessons learned

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 6: Workstream 5 priority actions

Workstream 5: Post implementation reviews	
Priority Actions	**5A.** Promote regular practice of "post implementation reviews"
	5B. Develop a feedback system to address the findings
	5C. Leverage on review findings from international agencies
	5D. Continue assessment into the operations phase

4.6. Workstream 6: Enhancing market capabilities

AMS are suggested to pursue initiatives that would improve their domestic infrastructure capabilities within the construction sector and the financing sector.

The objectives of this workstream and the priority actions are to:

- Further enhance the economic growth from strategic infrastructure investment, with the benefits flowing through the domestic economy
- Develop domestic capacity to create a more investor friendly environment with a dependable construction industry and agile financial markets

Common barriers to successful implementation:

- Informal labour markets
- Outdated construction standards
- Requirements for local content can be unclear or undefined
- Skills gap between local manufacturing / construction and the expectation of international contractors that are expected to take significant project risks.
- Lack of liquidity and experience in domestic markets of financing infrastructure projects

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 7: Workstream 6 priority actions

Workstream 6: Enhancing market capabilities	
Priority Actions	**6A.** Enhance construction and maintenance sector capabilities
	6B. Promote adoption of internationally recognised standards
	6C. Encourage domestic financial institutions to participate in financing infrastructure projects

4.7. Workstream 7: Enhancing productivity of existing assets

Investment in new physical infrastructure can be avoided by considering alternative means of addressing the project need, which in many instances could be by improving the productivity of existing infrastructure assets.

The objectives of this workstream and the priority actions are to:

- Effectively and efficiently increase the productivity of existing infrastructure assets
- Better manage demand so that it can be met by existing infrastructure
- Avoid unnecessary expenditure on large infrastructure projects

Common barriers to successful implementation:

- Lack of awareness of new technologies

- New technologies can be expensive and unproven
- Inertia – public reluctance to change the way they use existing infrastructure
- Existing projects may be operating under long term concession contracts which are difficult and expensive to interfere with
- Political sensitivities and public objections to new pricing structures
- Changing the configuration or use of existing assets may not be feasible or in the public interest, or may cause significant disruption / social impacts.

Suggested priority actions that can be implemented by AMS in addressing the objectives stated above are set out in the table below.

Figure 8: Workstream 7 priority actions

Workstream 7: Enhancing productivity of existing assets	
Priority Actions	**7A.** Broaden the delivery options assessment at pre-feasibility stage
	7B. Use new technologies to improve infrastructure efficiency
	7C. Seek private sector innovation
	7D. Implement demand management measures
	7E. Invest in maintenance / rehabilitation of assets

5. Making It Happen

5. Making It Happen

To implement the Framework, AMS may undertake projects/activities supporting the workstreams and priority actions thereunder. AMS are recommended to prioritise the workstreams as follows:

i) based on the extent to which the workstream best achieves and aligns with their current national priority/ies and focus. For example, if the current national focus is on spending less on greenfield projects and more towards improving the efficiency and effectiveness of existing infrastructure assets, then Workstream 7 should be prioritised; and/or

ii) based on their self-assessment score under Toolkit 1 (see below). Toolkit 1 is intended to provide a guidance for AMS and is not intended to be used as a strict prioritisation process / criteria. AMS could add in their own prioritisation process / criteria to best meet their individual country needs.

Two toolkits were developed to support the implementation of the Framework[38]:

i) Toolkit 1: Prioritisation toolkit: This toolkit aims to assist AMS to self-assess their performance across each workstream, identify and prioritise the workstreams that would have the most significant impact on infrastructure productivity in their country. The self-assessment produces a score on the current performance/ capability under each workstream and provides guidance on which workstreams and priority actions AMS should focus on for improvement.

ii) Toolkit 2: Action plan toolkit: This toolkit aims to assist AMS to customise their individual action plans taking into account their specific context based on the output from the prioritisation toolkit. The action plan template and instructions under this toolkit provide AMS with a means of documenting the plan and monitoring their progress against each priority action. It is acknowledged that there are different levels of development and needs across ASEAN. Some AMS may need resources from Dialogue Partners and other External Partners (DPs and OEPs) and/or the private sectors to support the implementation of their action plans.

It would be important for ASEAN to explore conducting some initial activities to support the implementation of the Framework. These may include convening socialisation activities and regional forums/workshops that would help improve the implementation of the workstreams as drivers of productivity. Having an initial socialisation forum, for example, would help familiarise AMS with the Framework and the underpinning workstreams and their priority actions. Such an activity would also provide an opportunity for AMS to learn more about utilising the toolkits.

Regional forums/workshops could serve as platforms to share best practices and build capacity to improve infrastructure productivity. These forums/workshops could cover the entire infrastructure project lifecycle and may focus on some themes, such as:

- infrastructure planning and coordination;
- project need analysis;
- key elements of pre-feasibility studies;
- environmental and social impact analysis;

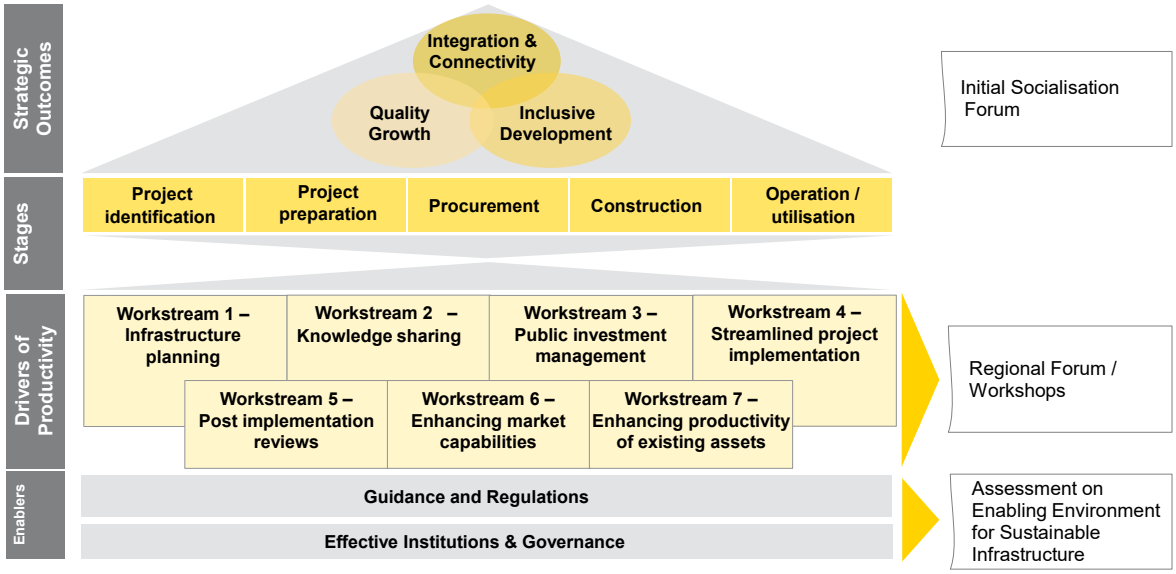
38 Refer to Annex D for further details on the toolkits.

- unsolicited proposals;
- project risk management; and
- asset management.

The above-mentioned prioritisation toolkit (Toolkit 1) supports identification and prioritisation of regional capacity building activities in common workstreams and priority actions and may be used to develop theme-specific regional activities.

In addition, a strong enabling environment would be key to ensure the implementation of the Framework is effective and meaningful. Conducting an assessment on enabling environment for sustainable infrastructure would be useful to help AMS identify and address regulatory and institutional gaps and needs to implement the priority actions (and action plans) recommended under the Framework. The findings and recommendations from the assessment could lead to additional items to be incorporated into the AMS individual action plans (Toolkit 2) as additional capacity building needs.

Figure 9: Overview: Indicative activities supporting the Framework implementation



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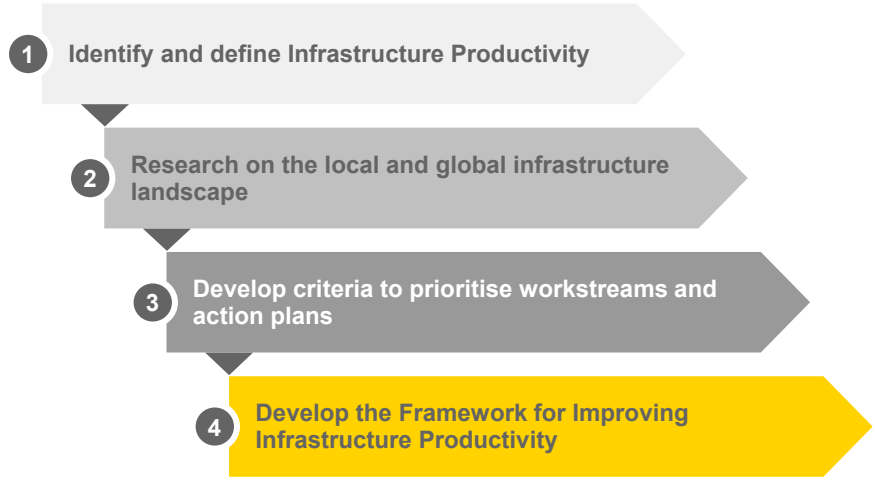
Annexes

Annex A – Developing the Framework

To develop this Framework, a four-step approach drawing on the work from existing external literature and frameworks, as well as findings and outcomes of consultations with AMS throughout the process was applied.

Figure 10: Four-step approach to developing the Framework for Improving ASEAN Infrastructure Productivity



Further details on each step are explained below.

Step 1 – Identify and define Infrastructure Productivity

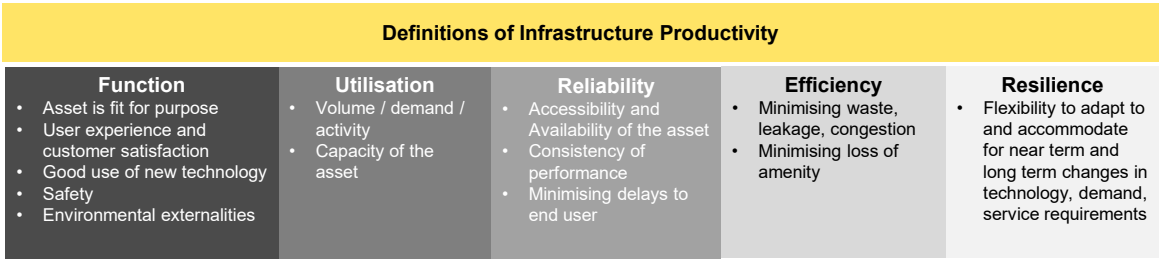
Step 1a – Definitions of infrastructure productivity

An important starting point in developing the Framework is to define what infrastructure productivity means. Productivity, at a basic level, is a measure of the rate at which inputs (labour, capital and intermediate goods) are transformed into outputs[39]. For example, ten dollars invested in a small business to purchase capital goods resulting in twenty dollars in sales for the business. However, productivity for infrastructure assets on the other hand can take many forms across various sectors, assets and countries. Therefore, defining productivity for infrastructure assets should not take a simple input / output approach. This Framework centres around five key definitions of productivity which have been collated across existing literature[40] and from discussions with key agencies from the AMS.

39 Australian Government, Department of Infrastructure and Regional Development, Measuring infrastructure asset performance and customer satisfaction: a review of existing frameworks, 2017.

40 Technical Appendix: Measuring infrastructure performance – National Infrastructure Commission (2018), Measuring infrastructure asset performance and customer satisfaction: a review of existing frameworks – Department of Infrastructure and Regional Development (2017).

Figure 11: Definitions of Infrastructure Productivity



"Good" infrastructure productivity can be demonstrated when an asset satisfies one or more of the above definitions. However, these definitions should not be applied uniformly across all infrastructure assets as each asset will have its own purpose and will be subject to its specific sector benchmarks and challenges.

The below provides an explanation on each of these definitions.

Function – whether the infrastructure asset meets or exceeds one or more of the following:

- Asset is fit for purpose – both in terms of its intended design specifications and output or service performance
- User experience and customer satisfaction – maximising user experience and customer satisfaction (if applicable) however noting that for some infrastructure asset types, users/customers will not be able to assess and judge all attributes of the infrastructure service provision. This is also challenging for specific infrastructure assets which may have more than one category of user and different service elements may be relevant across the different user groups
- Good use of new technology – where possible and practical, making best use the latest technology
- Safety – minimising fatality / injuries for both the customer and the employees
- Environmental externalities – ensuring environmental damage such as pollution and air quality is minimised

Utilisation – whether the infrastructure asset maximises the following:

- Volume / demand / activity – the output of the infrastructure asset (example service operating period, number of services, facility production) is maximised however only to the point where the marginal benefit outweighs the marginal cost
- Capacity of the asset – for example, maximising the passenger loading on a train without impacting on the user experience

Reliability – whether the infrastructure asset's performance meets or exceeds the following:

- Accessibility and Availability of the asset – avoiding unanticipated shutdown periods and minimising planned shutdowns
- Consistency of performance – quality of the output, levels of services, and user experience all meet the minimum set requirements and standards

Efficiency – whether the infrastructure asset minimises the following:

- Waste, leakage, congestion – the productivity of an asset is impaired if it is functioning inefficiently. For example: congestion on a road causes delay and loss of amenity or benefit for its users; leakage in a water distribution system results in increased costs of supply or loss of value to the end users
- Loss of amenity – certain functions of an infrastructure asset could be impeded resulting in loss of amenity. For example: lack of resources may result in parts of a hospital being unused, or used for a different less productive purpose

Resilience – flexibility to adapt to and accommodate for near term and long-term changes in technology, demand, service requirements. For example, flexibility to increase the number of public transportation services (buses, rail or roads) due to the growth in the population and development of local regions.

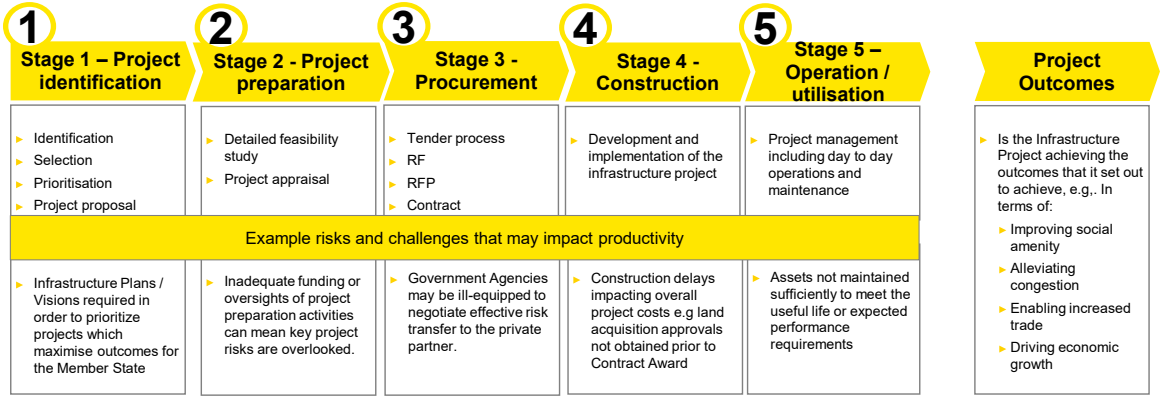
Step 1b – Infrastructure Productivity across the Project lifecycle

The Framework focuses on the five stages of the infrastructure project lifecycle:

- The first stage (Stage 1) is project identification and involves undertaking a high-level feasibility analysis to test whether the project meets some basic pre-requisites to be procured
- The second stage (Stage 2) is the project preparation stage where a detailed feasibility analysis is undertaken and if the project is found feasible, necessary approvals are obtained to proceed to the procurement stage
- The third stage (Stage 3) of the project is the procurement stage. At this stage, the project tender documents are prepared and bids invited from prospective bidders. A successful procurement stage would lead to signing of contract with the selected bidder
- The fourth stage (Stage 4) of the project is the construction stage. At this stage, the project contracts have been signed and the development and implementation of the infrastructure project occurs
- Eventually, the project enters into the operation/utilisation stage (Stage 5)

Each stage of the infrastructure project lifecycle brings forth different risks and unique challenges that can have an impact on productivity. Improvements to infrastructure productivity can be made at each stage of the project lifecycle and therefore it is important to consider productivity at each stage. The infrastructure project lifecycle is illustrated in the figure below:

Figure 12: Infrastructure project lifecycle



Step 2 – Research on the local and global infrastructure landscape

Step 2a – Desktop research

Step 2 involved extensive desktop research to understand the global and regional infrastructure landscape. Two key activities were undertaken as part of the desktop research as detailed in Chapter 3:

- Activity 1: obtain an understanding of the key and challenges faced across the entire project lifecycle in the infrastructure sector and
- Activity 2: review existing infrastructure productivity frameworks, guidelines and policies across AMS and best practices globally to understand the key challenges faced and best practices implemented in precedent studies, initiatives and projects

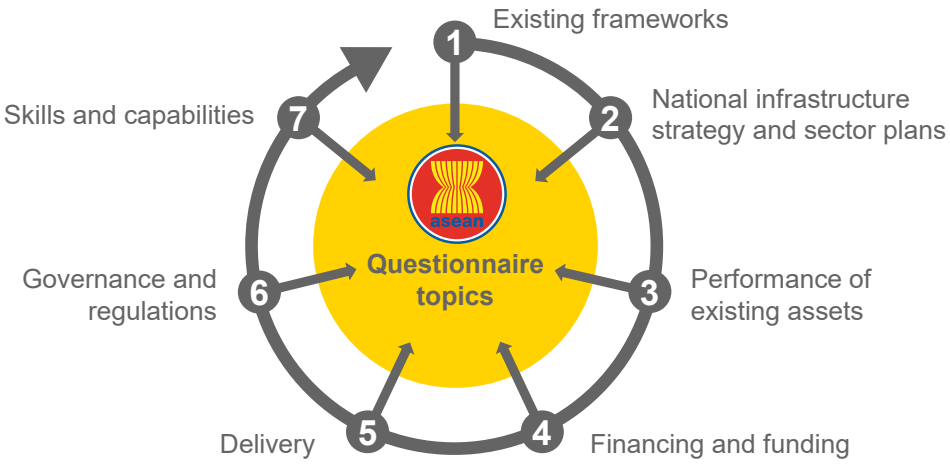
Step 2b – ASEAN Member State Consultations

In addition to the desktop research, consultations with key agencies were conducted across all AMS. A three-stage stakeholder consultation process was undertaken:

- Activity 1: list of the key agencies within each AMS was confirmed by the Lead Implementing Body for MPAC 2025 Strategic Area of Sustainable Infrastructure (LIB-SI) Representatives
- Activity 2: proposed questions for the consultations were developed and discussed during country consultations with relevant agencies
- Activity 3: feedback from the consultation process was incorporated within the Framework

The questions discussed with the AMS agencies covered seven key topics outlined in the figure below.

Figure 13: Questionnaire topics discussed with AMS agencies



Step 3 – Criteria to prioritise workstreams and action plans

To prioritise the workstreams and action plans which form the Framework, a set of five criteria was used to ensure each AMS can adopt and implement the recommendations. It is proposed that each workstream and action plan needed to:

- Have a significant impact on infrastructure productivity for each AMS
- Complement the outcomes of the two other initiatives under the MPAC 2025 Strategic Area of Sustainable Infrastructure
- Be detailed yet easy to implement for the relevant agencies in each AMS
- Be cost efficient for the relevant agencies in each AMS to adopt and implement
- Be flexible and adaptable, able to be adopted by each AMS despite the different level of development across AMS

Step 4 – Develop the Framework

A preliminary Framework for Improving ASEAN Infrastructure Productivity was prepared and presented at the Forum on the Development of Framework for Improving ASEAN Infrastructure Productivity held from 30 September to 1 October 2019 in Jakarta, Indonesia, to gather feedback and to further refine the Framework[41].

Two toolkits were developed to support the implementation of the Framework. Toolkit 1 aims to assist AMS to self-assess their performance across each workstream, identify and prioritise workstreams and priority actions which would have the biggest impact on infrastructure productivity in their country, and identify relevant capacity building needs at a national level. Toolkit 2 aims to help AMS customise their individual action plans for implementation.

41 The Forum was attended by 80 participants, comprising representatives from LIB-SI and other relevant ASEAN bodies, as well as external partners. The other relevant include: (i) ASEAN Connectivity Coordinating Committee (ACCC), (ii) Senior Transport Officials Meeting (STOM), (iii) Senior Officials Meeting on Energy (SOME), and (iv) Working Committee on Capital Market Development (WC-CMD) Infrastructure Finance Working Group (IFWG). The ASEAN's external partners include: (i) Dialogue Partners (DPs), (ii) Development Partners, (iii) Asian Development Bank (ADB), and (iv) The World Bank. ASEAN's external partners were invited to participate in the Forum on Day 1 only.

Annex B – Further Details on Global Infrastructure Productivity and Performance Frameworks

Case Study 1: Infrastructure Performance Indicator Framework Development (New Zealand)

The Infrastructure Performance Indicator Framework Development[42] provides infrastructure performance indicators that can be used to help evaluate progress and efficiency against the National Infrastructure Plan's[43] (NIP) objectives and to guide future development of plans and objectives for individual infrastructure sectors. The framework was prepared in 2013 for the National Infrastructure Unit (NIU), a division of The Treasury[44]. The Treasury is New Zealand's lead advisor to the Government on economic and financial policy. Based within the Treasury, the NIU is responsible for formulating and monitoring progress on the NIP, establishing cross-government frameworks for infrastructure project appraisal and capital asset management and provides support to the new National Infrastructure Advisory Board.

By applying this framework, thorough assessments of various infrastructure sectors were carried out. Results enabled comprehensive understanding of the infrastructure industry, and this in turn allowed for clearer comparison of maturity between sectors. Key characteristics of transport, telecommunications, energy and water sectors were studied to understand the relationship to welfare and ultimately how they align with NIP's objectives. The role of existing data sets and indicators was also analysed to promote a set of potential indicators that could utilise existing data but still serve as a rigorous tool for assessment of infrastructure productivity.

The development of the framework was aimed at providing a recommended set of New Zealand infrastructure indicators relating to the performance of infrastructure sectors and informing the development of future versions of the NIP. The objective is to improve the information that can be used for future infrastructure policy development and ultimately facilitate better infrastructure productivity throughout the framework. Consistent with the NIP, the indicators have also helped to improve the transparency and efficiency of infrastructure policy development.

42 Beca and Covex (March 2013). Infrastructure Performance Indicator Framework Development.

43 New Zealand Government (2011). National Infrastructure Plan 2011.

44 The Treasury (March 2018). https://treasury.govt.nz/about-treasury/who-we-are

Case Study 2: Australian Transport Assessment and Planning Guidelines – T4 Productivity Metrics (Australia)

The Australian Transport Assessment and Planning (ATAP) Guidelines (the Guidelines) is a transport infrastructure planning and decision-support framework, which outlines best practice for transport planning and assessment and have proved to be essential in improving infrastructure productivity in Australia[45]. They are a key component of processes to ensure that proposals to improve transport systems in Australia achieve jurisdictional[46] objectives, provide maximum efficiency and net benefit to the community and represent value for money. It is endorsed by all Australian jurisdictions and was published by the Transport and Infrastructure Council in 2016. Users of the Guidelines include government departments and agencies, private firms, individuals, industry bodies and consultants. The ATAP Guidelines support the development of effective, cost efficient and robust transport decision-making by providing practical, sound guidance on:

- Developing goals, transport system objectives and targets
- Integrating the planning of transport systems, including integration with land use
- Identifying, assessing and prioritising transport problems
- Identifying suitable and various options for solving transport problems
- Rigorously assessing and appraising options
- Developing business cases for preferred solutions
- Prioritising proposed initiatives and programme development
- Reviewing performance

With transport infrastructure as an important contributor to national productivity in Australia, emphasis is placed on improving infrastructure productivity and performance in the transport sector. The ATAP Guidelines provide a detailed analysis of Australia's transport sector and propose relevant productivity metrics for in-depth comparison of productivity gains and benefits specific to transport initiatives. It is expected that the Guidelines will continue to be reviewed and updated in future on an ongoing basis and an ATAP Working Group has been established to facilitate this process.

45 Users of the Guidelines include government departments and agencies, private firms, individuals, industry bodies and consultants which have been used to develop multiple transport projects in Australia.

46 The term 'jurisdictions' refers to the collection of all governments in Australia: national, state, territory and local. Governments are the owners and primary users of the Guidelines. Government stakeholders who find the framework relevant include strategic and initiative planners and business case developers. Non-government stakeholders include proposers of initiatives.

Case Study 3: Benefit Management Framework 2016 (Australia)

The Benefit Management Framework[47] (the Framework) provides a 'line of sight' from investment-level indicators to the benefits and outcomes that VicRoads[48] and ultimately the government aim to achieve. Published in 2016 by VicRoads, the framework focuses on identifying clear links between indicators and outcomes to build productivity and ultimately allow improvement of assessment and decision-making processes. As part of the Department of Transport, VicRoads works with other transport agencies to meet Victoria's transport challenges and achieve the vision set out in the *Transport Integration Act 2010*[49].

The Framework seeks to provide a consistent approach to identifying, monitoring and evaluating the success of VicRoads investments. It applies to planning, prioritisation and evaluation of all investment decisions in VicRoads which then allows for better assessment of infrastructure productivity. It is most relevant to those who need to clearly articulate how each investment contributes to the strategic intent of the organisation as well as to those who need to ensure that investments under management deliver benefits promised in the proposal. As VicRoads manages many of Australia's road sector initiatives, using the Framework to facilitate deep-dive analyses into the roads sector provides opportunities to improve assessment of road performance.

Case Study 4: National Infrastructure Commission – Performance Measures (UK)

The National Infrastructure Commission[50] (NIC): Performance Measures proposes a list of infrastructure performance measures for the NIC to inform the preparation of the National Infrastructure Assessment[51] (NIA) and assess performance and productivity against government objectives. It serves as a robust framework that seeks to identify a set of quantitative performance measures to establish an understanding of the current status, efficiency and shortcomings of the UK's existing infrastructure assets and how these change over time.

The report was commissioned by the NIC, prepared by JBA Consulting and published in 2017. The NIC provides expert, impartial advice to the government on infrastructure. Relevant works of NIC include setting out the NIC's assessment of long-term infrastructure needs with recommendations to the government, in-depth studies into the UK's most pressing infrastructure challenges, making recommendations to the

47 VicRoads (March 2016). Benefit Management Framework.

48 VicRoads is a State Government agency that owns, manages and regulates the arterial road network, delivers road safety initiatives, and provides customer focused registration and licensing services (2018). https://www.vicroads.vic.gov.au/

49 Victoria State Government (2018). Transport Integration Act 2010 https://transport.vic.gov.au/about/legislation/transport-integration-act

50 National Infrastructure Commission (2019). https://www.nic.org.uk/

51 National Infrastructure Assessment (2018). https://www.nic.org.uk/publications/national-infrastructure-assessment-2018/

government and monitoring the government's progress in delivering infrastructure projects recommended by the NIC.

In the study, an overview of the infrastructure industry covering six sectors namely digital communications, energy, flood risk management, solid waste, transport, water and wastewater sectors was provided in this framework. Across infrastructure sectors, those which have been the focus for longer-term policy and action were characterised more fully in terms of numbers of measures. The transport sector for example, had the most number of measures.

Case Study 5: National Infrastructure Commission – Measuring Infrastructure Performance Technical Appendix (UK)

The National Infrastructure Commission (NIC) created a framework to assess the quality of the UK's infrastructure services. NIC further consulted on these measures in the interim report – Congestion, Capacity, Carbon: Priorities for national infrastructure[52] to generate feedback. The Appendix (published in 2018) provided further detail on the consultation responses received and serves as an extension of the performance measurement framework published in 2017. It sets out how the Commission intends to fill gaps by developing performance measures that do not yet exist, including measures linked to design quality and resilience. The Commission intends to use these measures to assess the performance, function and productivity of infrastructure over time as well as its own progress against its objectives. The framework also seeks to assess the quality of the UK's infrastructure services and compare different infrastructure systems.

The current set of performance measures is still subject to amendments as the Commission will continue to work on specific elements of the performance measures. For example, the Commission intends to develop upon resilience measures by picking up the stress test measures as part of the resilience study and follow up with relevant stakeholders. Other measures that the Commission is working on are design-quality measures and transport connectivity measures. The development of such measures is intrinsic in improving current infrastructure productivity to enhance performance. This framework taps on the existing set of infrastructure sectors discussed in the 2017 NIC Performance Measures Framework and enhances the assessment of these sectors with proposed new domains. As such, transport, energy, solid waste, water and waste water, flood risk and digital communications sectors are met with more holistic assessment measures. The measures in the framework is envisaged to work across most sectors, allowing the Commission to efficiently compare productivity of different infrastructure systems.

52 National Infrastructure Commission (2017). Congestion, Capacity, Carbon: Priorities for national infrastructure https://www.nic.org.uk/wp-content/uploads/Congestion-Capacity-Carbon_-Priorities-for-national-infrastructure.pdf

Case Study 6: Florida Department of Transportation Performance Report (US)

The 2017 Performance Report was crafted by Florida Department of Transportation (FDOT)[53] and provides a snapshot of select measures that are used to inform decisions and provide feedback on the performance of FDOT, FDOT's partners and Florida's transportation system. The report serves as a framework aimed at providing a high-level overview of infrastructure performance and how it is driven by rigorous infrastructure productivity measures. This report is also a development of FDOT's previous performance framework (2015)[54], which was identified as containing best practices. The FDOT is an executive agency that reports directly to the Governor. Its main responsibility is to coordinate the planning and development of a safe, viable, and balanced state transportation system serving all regions of the state, and to assure the compatibility of all components, including multimodal facilities. The framework focuses on the transport sector but provides an integrated approach to understanding the sector productivity. The four overarching performance measures identified ranging from infrastructure to safety, has allowed for development of targeted indicators critical for all-rounded assessment of the transport sector.

53 Florida Department of Transportation https://www.fdot.gov/

54 Department of Infrastructure and Regional Development (2017). Measuring infrastructure asset performance and customer satisfaction: a review of existing frameworks.

Annex C – Details of Workstream Priority Actions

Workstream 1: Infrastructure planning priority actions

Table 2 : Workstream 1 priority actions

Priority actions	Description
1A. Map the infrastructure ecosystem	Mapping an "infrastructure ecosystem" as part of the national infrastructure strategy or master plan will help identify all the key stakeholders in the infrastructure process and ensure each stakeholder understands how they can contribute to the overall National strategy by clarifying their roles and responsibilities. The infrastructure ecosystem map will identify: • The central coordinating agency / ministry for coordination of sector master plans and project selection (if any) • The central committee for infrastructure planning (if any) • The key sector agencies / line ministries; • Sub-national or local government agencies responsible for infrastructure; and • Other key stakeholders involved in the planning and approval process e.g. Ministry of Finance

Priority actions	Description
1B. Improve inter-agency communication and coordination.	Promote and empower better communication and coordination between government stakeholders during infrastructure planning and project development stages. When communication and coordination are improved, delays in the approval process are minimised as the feedback/ comments from key stakeholders are captured earlier in the planning process. It reduces the risk of issues being raised later in the process, when the cost and implications of delays are greater. The effort to improve inter-agency communication and coordination could be overseen by an existing central government agency/ministry, which would provide an institutional means to coordinate infrastructure planning and implementation in such a way that is best for the nation. It needs to be recognised that there are often divergent interests between central, sub-national or local governments, and planning is often hindered when objectives differ. A central infrastructure planning agency would need to consult with stakeholders and seek to align objectives such that the different areas of government can move forward in a coordinated manner. The role of the agency/ministry would be to: • Prepare the National Infrastructure Strategy which is aligned with the social and economic vision of the AMS • Set outcome-based goals for each implementing agency (refer to priority action 1C below) • Review and approve sector-based master plans that are aligned with the vision and the National Infrastructure Strategy • Encourage communication between line ministries / implementing agencies • Coordinate planning activities where interdependencies exist From the consultation with AMS, this is being implemented to varying extent across ASEAN. AMS who already identified such central coordinating agencies should review the role and institutional framework surrounding these agencies and put in place measures to enhance their role and effectiveness as necessary.

Priority actions	Description
1C. Define target outcomes for implementing agencies / line ministries	The central coordinating agency should set outcome-based medium term infrastructure goals for each sector (and/or region) which are aligned with the AMS' vision for economic development and growth. Implementing/line agencies should be best placed to develop their national sector master plans to achieve the target outcomes. Target outcomes need to be relevant and achievable for the implementing/line ministry, recognising that some outcomes will require cross-government collaboration.
1D. Build regional connectivity objectives into national infrastructure strategy and sector master plans	The AMS' vision for its role in the regional economy should be enshrined within the National Infrastructure Strategy. Line ministries preparing sector master plans should coordinate with counterparts in neighbouring AMS to encourage alignment of projects which promote connectivity on either side of a border.
1E. Prioritise infrastructure planning with interdependencies which have a multiplier effect on the benefit	Although individual projects achieve the national strategy, projects that consider the wider network / environment should also be prioritised. For example, if a port is to be redeveloped in accordance with the maritime sector master plan, relevant infrastructure projects in other sectors that enhance connectivity to that port should also be prioritised.
1F. Engage stakeholders early on major projects	Carry out consultations with relevant stakeholders, including the public, when considering major projects for inclusion in infrastructure master plans. Stakeholders can be given the opportunity to raise concerns and potential roadblocks that may hinder project development early. There is a need to balance public opinion and economic needs. For example, users would choose not to pay for toll roads, however improved road infrastructure can have multiplier effects to the economy.

Priority actions	Description
1G. Develop a project screening, selection and prioritisation procedures	Establish clear procedures and criteria for screening, selection and prioritisation of projects at each critical milestone. Such criteria should be based on a robust business case including: • Delivery options analysis (i.e. critically assessing different infrastructure (or other) solutions to achieve the desired project outcomes • Economic Cost Benefit Analysis • Assessment of the whole of life cost and impact of the infrastructure development • Selection of the right implementation and contracting model (e.g. PPP or public funding)
1H. Establish rigorous policy and procedures for dealing with unsolicited proposals	Unsolicited proposals can be a means of accelerating infrastructure delivery. However, the full costs and benefits of such proposals need to be considered along with alignment with the stated long-term infrastructure strategic objectives.

Workstream 2: Knowledge sharing priority actions

Table 3 : Workstream 2 priority actions

Priority actions	Description
2A. Understand customer preferences and trends	Use new technologies available, particularly those maximising the use of big data, to understand the changing demands of both current users and future generations, and the impact this will have on infrastructure strategies.
2B. Promote systematic collection of data	Relevant line ministries should create systems to collect data annually on their national infrastructure network, e.g. on utilisation (traffic / passenger numbers, transmission, TEUs) and condition. Line ministries should collect data from any private or state-owned infrastructure operators. Concession contracts will need to include necessary provisions for providing data to the ministry. It may be possible to encourage public reporting on asset condition, e.g. crowd sourcing of data using mobile apps. The public may be inclined to report problems such as potholes where it is in their interest to see improvements in the asset quality.
2C. Back up project proposals with current data and robust forecasts	Project owners should commission robust demand or traffic studies, building on current data and historic trends. Studies need to recognise the impact of changing externalities. Expert advice may need to be sought to develop forecasts which are subject to externalities such as technological or climatic disruptions.
2D. Facilitate greater data sharing among government agencies and stakeholders	Relevant line agencies/ministries should make their data available to other agencies/ministries. There can also be benefits (improvement in project outcomes) from making data available to other project stakeholders such as developers, operators and end users. For example, in an environment of advancing technology and ever increasing smart infrastructure, no one party will own all of the data available and relevant for smart infrastructure decision-making. With more open data, the public and third-party developers can put them to good use in creating people-centric infrastructure solutions. This could include, for example, sharing of surveys conducted by government agencies or sharing data captured through public service apps. Such data can provide developers and infrastructure operators with details on customer preferences.

Priority actions	Description
2E. Collect project data during and after project implementation.	Productivity of an asset can be improved through careful monitoring of design, construction and commissioning activities during project implementation. This can drive better project outcomes through improving management of costs and ensuring that the original project scope and objectives are met. Contracts should include data sharing and reporting requirements to facilitate this. Data collection should also continue post-implementation to assess whether the asset is performing and being utilised as intended.
2F. Regular reporting by agencies on key metrics aligned with target outcomes	Relevant line ministries should be required to report periodically (quarterly / annually) on key metrics that are aligned to their target outcomes. For example, if a Ministry of Transport has been set a KPI to reduce travel time between two major cities from X minutes to Y minutes, this travel time needs to be regularly measured and reported on. The central coordinating agency should be responsible for collating and publishing the metrics as a means of reporting progress against the national infrastructure plan.

Workstream 3: Public investment management priority actions

Table 4 : Workstream 3 priority actions

Priority actions	Description
3A. Provide greater certainty of funding for infrastructure projects	Establish capital planning procedures to enable government agencies to budget for and commit funding to capital-intensive project that may last beyond the current budget cycle or investment planning cycle.
3B. Consider whole of life costs of an asset when making investment decisions	Require project feasibility studies to include an assessment of the whole of life costs of a project. By considering the whole of life costs, agencies can better assess the affordability of the on-going asset costs, and plan for these costs accordingly.
3C. Promote budgeting for infrastructure maintenance	Government agencies should be required to maintain an asset management system that predicts requirements for major maintenance and capital replacements. Activities can then be planned and projected expenditure should be provided for within the budget. Deferral of such expenditure should be discouraged and reported and monitored at senior levels within the responsible government agency(ies). Similarly, agencies could be required to budget for a percentage of asset book value to be spent on recurrent maintenance.
3D. Promote use of PPP or Output and Performance Based Contracting	Transferring responsibility for maintenance to a private sector partner / contractor can be a means of driving more consistent maintenance practices and better asset performance. • Under PPP contracts, a private sector operator can draw on the user fees to fund maintenance activities. • Output and Performance Based Contracting (OPBC) is a model being promoted by MDBs. This assumes contracting operations and maintenance (O&M) of assets with a fixed price for a number of years and setting required standard and KPIs. It must be noted that payments under OPBC contracts still need to be funded out of the agency's maintenance budget, and this can lead to a lack of flexibility on where to spend available funds.

Workstream 4: Streamlined project implementation priority actions

Table 5 : Workstream 4 priority actions

Priority actions	Description
4A. Put in place plans for approvals and land acquisition early	The government contracting agency (GCA) should be driving the planning process, and must stipulate the permitting and land requirements of the project in the pre-feasibility study. With early identification of the land requirements, the GCA can allocate budget and put in place a plan for achieving the land acquisition requirements as early as possible, thereby mitigating the risk of project delays.
4B. Undertake the Environment and Social Impact Assessments early	Environmental Impact Assessment (EIA) and Social Impact Assessment (SIA) should be established at the beginning of the project rather than in the middle of the project to avoid possible issues that can delay progress.
4C. Optimise the contracting structure	Structure contracts to drive best value for money, e.g. fixed price output-based contracts, milestone or performance-based payments with clear KPIs. Create opportunities for private sector finance to participate, but not on a fully guaranteed basis.
4D. Set appropriate qualification and evaluation criteria for bidder selection	When selecting contractors or private sector partners to deliver infrastructure project, bid evaluation should assess the capability, track record, and financial standing of the bidder. Purely or primarily selecting a bidder based on lowest price can lead to future difficulties, such as poor quality, delays, or insolvency.
4E. Enforce rigorous procedures for unsolicited proposals	Only permit unsolicited proposals for projects that align fully with the AMS' vision and National Infrastructure Strategy. Unsolicited proposals are subject to the same level of scrutiny and competition as government-initiated projects.

Priority actions	Description
4F. Strengthen contract management capability	Review and build the capacity of the contract management units to ensure that the units have the commercial experience and authority to manage contractors and negotiate claims effectively. Specifically: • Establish project monitoring function to request and track expenditure and contractor performance against contract requirements. • Establish claims management capability that can respond to claims and negotiate firmly with contractors • For long term PPPs or Output and Performance Based Contracts (OPBC), establish contract management procedures for receiving and validating performance reports, checking periodic invoices, enforcing the intended risk transfer, and ensuring all parties (including the Contracting Authority) adhere to their contractual obligations in a timely manner.

Workstream 5: Post implementation reviews priority actions

Table 6 : Workstream 5 priority actions

Priority actions	Description
5A. Promote regular practice of "post implementation reviews"	The central coordinating agency should promote and, to the extent possible, require post implementation reviews to be carried out following completion of a project. The review should cover the whole process from pre-feasibility study to completion and collated in a centralised post implementation review information bank ("information bank") for ease of reference. Guidelines could be developed on the required content of a post implementation review, including a template report covering all the key areas to assess. Criteria should be set for projects (e.g. projects over a certain size or of national importance) that must complete a post implementation review and are required to submit findings to the central coordinating agency, or similar body.
5B. Develop a feedback system to address the findings	Establish formal reporting and response procedures. Findings must be first collated in a centralised information bank and then fed back through to the relevant decision-makers and project management units within the relevant line ministry. Implementing agency should be required to respond to the findings of the post implementation review. Again, responses received should be collected in a centralised information bank. Improvement or rectification of shortcomings observed should be evidenced by government agencies when seeking approval for future projects. System wide recommendations for process improvements should be circulated to all relevant ministries.
5C. Leverage on review findings from international agencies	As international donor agencies and MDBs carry out their own reviews on projects they have involved in, government agencies can leverage on the findings from these reviews and seek further feedback from external perspectives.
5D. Continue assessment into the operations phase	Assessment and review should be continued into the operation phase to track the performance of an asset and taking into account the lessons learned from similar past projects. Findings should be used to identify corrective measures and remedies that will improve the performance and productivity of the asset.

Workstream 6: Enhancing market capabilities priority actions

Table 7 : Workstream 6 priority actions

Priority actions	Description
6A. Enhance construction and maintenance sector capabilities	Promote partnering between domestic contractors and international contractors to develop local capabilities and experience in delivering infrastructure projects. In addition to requirements for local content, include requirements on international contractors to transfer knowledge and skills to domestic contractors and build capacity.
6B. Promote adoption of internationally recognised standards	Having domestic contractors adhere to internationally recognised standards can improve construction practices and the quality of the infrastructure assets. This in turn will facilitate partnering between international and domestic contractors.
6C. Encourage domestic financial institutions to participate in financing infrastructure projects	Implement programmes to develop domestic financing capability and adapt regulations to enable projects to access suitable funding sources such as insurance and pension funds.

Workstream 7: Enhancing productivity of existing assets priority actions

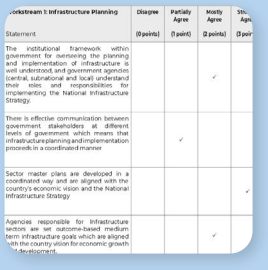
Table 8 : Workstream 7 priority actions

Priority actions	Description
7A. Broaden the delivery options assessment at pre-feasibility stage	At the pre-feasibility stage, government agencies should invest time and resources in examining options for upgrading or enhancing the use of existing assets as an alternative to the proposed construction of a new asset. Diligent research and option analysis can help to assess all opportunities for meeting the infrastructure demand, of which development of new infrastructure may not be the most optimal case.
7B. Use new technologies to improve infrastructure efficiency	Government agencies should consider new technologies for improving productivity of existing infrastructure, for example: • Increase the efficiency of critical infrastructure such as ports and airports through operational improvements and reductions in processing times, aided by digital infrastructure • New technologies for finding and repairing leaks in water networks • Smart metering for power networks
7C. Seek private sector innovation	Seek private sector innovation to meet a defined project need or outcome in the optimum manner. The private sector may bring fresh ideas and new technologies to help increase the productivity of existing infrastructure assets. For example, a default solution to reduce congestion on an existing freeway is to make a capital investment to widen the road. An alternative to this is to obtain private sector innovation to identify new / smart technology/s to better manage and control traffic. Private sector innovation can be obtained by: • Engaging private sector through an early market consultation process; or • As part of the tender process where the best solution proposed by the private sector bidders is then implemented.

Priority actions	Description
7D. Implement demand management measures	Demand management can, if implemented correctly, reduce the need for new infrastructure while at the same time deliver social and economic benefits. Examples of demand management measures include: • Use pricing as a regulator of utilisation / consumption to reduce or eliminate bottlenecks (e.g. discriminatory pricing, congestion charging). Pricing mechanisms increase awareness of consumption. • Promote adoption of the shared economy - e.g. ride sharing / on-demand bus services to reduce car / bike numbers on the streets. • Incentivise industry to reduce power consumption during peak periods
7E. Invest in maintenance / rehabilitation of assets	Assess the condition of existing assets and identify opportunities for low cost improvements. Replace older components of a system that inhibit the performance (e.g. signalling in a rail system) Encourage research to support business cases to upgrade existing assets instead of building new ones

Annex D – Toolkits

A summary of each toolkit is provided below.



Toolkit 1. Prioritisation Toolkit

- AMS competes a self-assessment questionnaire aligned with the seven workstream.
- Each question is weighted and the weighting can be adjusted by AMS depending on how important they view each topic.
- The self assessment produces a score for current performance / capability under each workstream and provides guidance on which Member States Should focus on for improvement.

Toolkit 2. Action Plan Toolkit

- Member States use the output from the Prioritisation Toolkit to identify the workstreams and priority actions from the Infrastructure Productivity Framework that they wish to focus on.
- Member States will develop their own action plan/s to address these areas.
- The Acton Plan template and instructions provide AMS with a means of documenting the plan and rnonitoring their progress against each priority action.

Toolkit 1: Prioritisation Toolkit – Instructions

For each workstream under Toolkit 1, a series of statements[55] are provided for AMS to consider. AMS should review each statement and follow the following steps:

- Step 1 - Allocate a self-rating for each statement (disagree, partially agree, mostly agree or strongly agree);
- Step 2 - Assign a weighting for each statement depending on how important they view each statement is towards achieving the workstream outcomes (3 being the highest weighting). The toolkit includes a default set of weightings which the AMS can choose to accept;
- Step 3 - Calculate a score for each statement (self-rating Points x Weighting assigned):
- Step 4 - Document any key comments or observations; and
- Step 5 - Tally the "Total Score" for each workstream and compare this to the "Maximum Total Score". Total Score divided by the Maximum Total Score will be the "Score as a percentage" (100% being the highest).

The Score as a percentage produces a self-rating for the AMS' current performance / capability under each workstream and provides guidance on which workstream/s Member States should focus on for improvement.

55 The statements are made in response to the priority actions of the workstreams, and the number of statements does not necessarily the same as the number of priority actions identified in the workstreams.

An example for Workstream 1 has been completed below for illustration purposes.

An Excel workbook[56] is provided to assist AMS with capturing their self-assessment and calculating the scores against each workstream. It also provides an overall visual indicator (spider diagram) on how each AMS is performing across all workstreams. The instructions on how to use the Excel workbook are provided within it.

An example of the overall self-assessment scoring diagram has been completed below for illustration purposes.

56 The soft copy of the excel workbook is available for download at https://connectivity.asean.org. If not found, a request for a copy may be sent via e-mail to connectivity@asean.org.

a. Toolkit 1. Prioritisation Toolkit: Workstream 1 (sample completed for illustration purposes)

	Workstream 1: Infrastructure Planning Statement	**Disagree** **(0 points)**	**Partially Agree** **(1 point)**	**Mostly Agree** **(2 points)**	**Strongly Agree** **(3 points)**	**Weighting*** **(1, 2 or 3)**	**Score** **(Points x Weighting)**	**Comments/Observations**
1	The institutional framework within government for overseeing the planning and implementation of infrastructure is well understood, and government agencies (central, subnational and local) understand their roles and responsibilities for implementing the National Infrastructure Strategy.			✓		3	6	The decision-making unit/agency (for project planning) is clearly defined as part of the institutional framework. However, the roles of the implementing agencies in supporting the other sector agencies are not clearly articulated.
2	There is effective communication between government stakeholders at different levels of government which means that infrastructure planning and implementation proceeds in a coordinated manner		✓			3	3	Planning and coordination across the various sector agencies are typically not prioritised. Meetings and/or communications are only organised on an ad-hoc needs basis.
3	Sector master plans are developed in a coordinated way and are aligned with the country's economic vision and the National Infrastructure Strategy				✓	2	6	All sector master plans are reviewed and approved by the National planning agency and are all aligned with the country's economic vision.
4	Agencies responsible for Infrastructure sectors are set outcome-based medium term infrastructure goals which are aligned with the country vision for economic growth and development.			✓		2	4	Formalised outcome-based goals are still yet to be developed for some infrastructure sector agencies.

	Workstream 1: Infrastructure Planning Statement	**Disagree** **(0 points)**	**Partially Agree** **(1 point)**	**Mostly Agree** **(2 points)**	**Strongly Agree** **(3 points)**	**Weighting*** **(1, 2 or 3)**	**Score** **(Points x Weighting)**	**Comments/Observations**
5	The framework and procedures for screening, selection and prioritisation of infrastructure projects are effective and are well understood by the approving and implementing agencies.			✓		3	6	Although there is a clear framework and procedures for screening, selecting and prioritisating projects, in practice, projects with the most financial profitability are typically prioritised and selected to proceed.
6	There are established procedures for dealing with unsolicited proposals and these include considering how the project aligns with the National Infrastructure Strategy.		✓			2	2	There are currently no formal procedures to deal with unsolicited proposals. As such, external guidelines (e.g World Bank) have been utilised to date as support mechanisms.
						Total Score	27	
						Maximum Total Score**	42	
						Score as a percentage	64%	**Note 1**

* AMS may adjust the Weightings based on their own assessment of areas that would make a meaningful difference in the context of their country.
** Maximum Score is calculated as the sum of all the weightings multiplied by the maximum score for an individual statement (3).

Note 1

The self-assessment score of 27/42 or 64% indicates that a number of areas for Workstream 1 (Infrastructure Planning) are currently performing well e.g sector master plans are aligned with the country's economic vision and the National Infrastructure Strategy ensuring all sectors have a focused and unified plan towards infrastructure development.

However, some areas require improvement. If Workstream 1 was chosen as a priority workstream, then the AMS should focus on the following areas:

- Improving communication and coordination across various government stakeholders at different levels of government; and
- Developing formal procedures to deal with unsolicited proposals.

An action plan would be developed to address these two areas using Toolkit 2: the action plan toolkit.

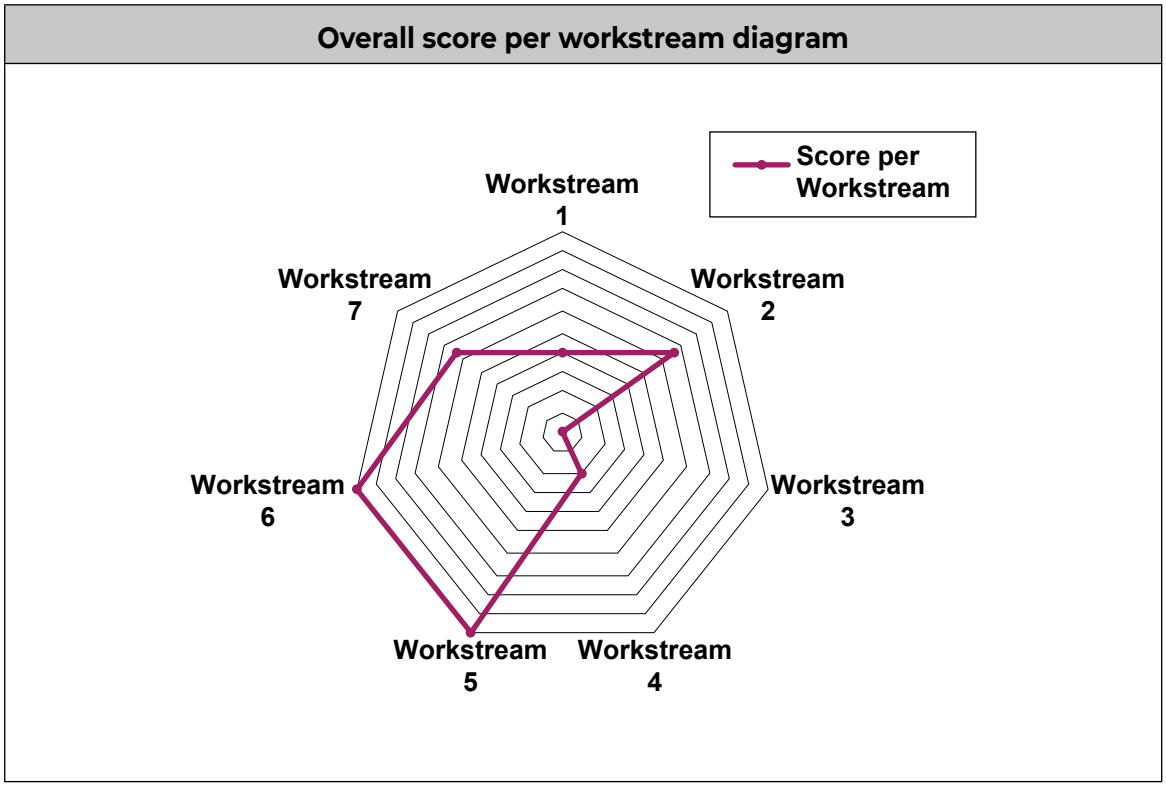
b. Toolkit 1. Prioritisation Toolkit: Overall self-assessment score (sample completed for illustration purposes)

The below overall self-assessment scoring diagram indicates that the AMS should:

- Focus on prioritising Workstreams 1, 3, and 4 and identify the priority actions that require attention;
- Identify the key areas which require improvement under Workstream 2 and 7; and
- Recognise that they are performing well for Workstreams 5 and 6.

The above should be considered as part of the AMS individual action plan development using the action plan toolkit (Toolkit 2).

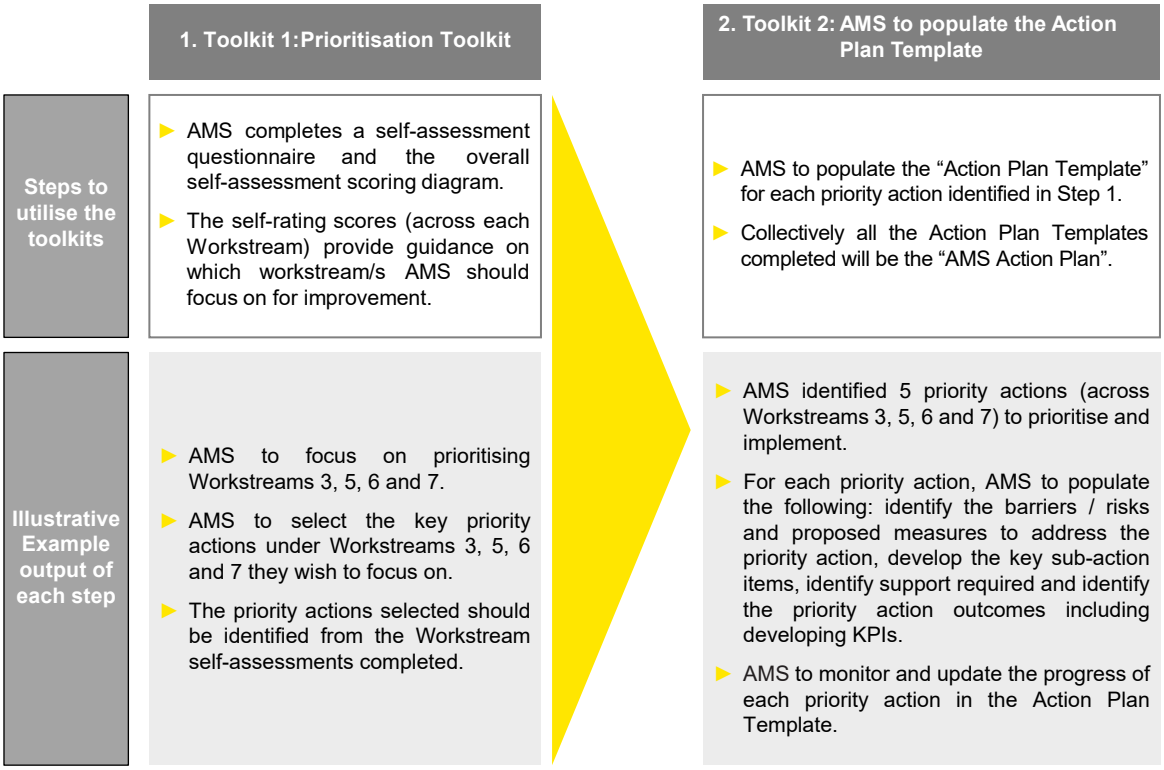
Figure 14: Illustrative example of the overall score per workstream diagram



Toolkit 2: Action Plan Toolkit – Instructions

The Action Plan Toolkit is intended to capture the details required for implementing a priority action. A template sheet will need to be completed for each priority action that is identified for inclusion in the Action Plan for an AMS following the self-assessment exercise carried out using the Prioritisation Toolkit. A summary of the steps required to utilise the toolkits is detailed below.

Figure 15: Summary of the steps to utilise the toolkits



The Action Plan Toolkit includes a number of fields which need to be completed by the AMS:

- **Barriers / Risks and proposed measures to address:** AMS to identify and document any barriers and risks to implement the priority action and the sub-action items identified.
  - For each barrier / risk identified, AMS to propose measures to address these areas; and
  - Update each barrier / risk with the progress made to date.
- **Key sub-action items**: develop the key sub-action items required to implement the chosen priority action. This includes:
  - Identifying the "target completion date" for each key sub-action item including an overall target completion date for the priority action;
  - Identifying an "action owner" responsible for overseeing each key sub-action item; and
  - Updating each key sub-action item with the progress made to date.

The key sub-action items should consider any capacity building needs to facilitate the workstream outcomes.

- **Support required**: identify any resource / support required to implement the key sub-action items. For example:
  - Resource/s required to lead / drive the priority action under review;
  - Supporting staff required to assist with the implementation of the key sub-action items; and
  - Any other support required both regionally and nationally. For example, support required from other sector agencies, such as Ministry of Finance, from neighbouring AMS for cross border projects.
- **Outcomes**: identify the priority action outcomes including:
  - Documenting the benefits of the key sub-action items (quantitative and qualitative). For example, long term cost savings for the asset under review, improved social benefits for the wider community; and
  - Developing KPI / Metrics to track the progress of the priority action. For example, the percentage of sub-action items completed within the target completion date.

The resulting Action Plan should be monitored and reviewed on a regular basis and updated to track progress for each priority action.

A template for Priority Action 7b under Workstream 7 has been completed below for illustration purposes.

a. Toolkit 2. Action Plan for Priority Action 7B (completed for illustrative purposes)

Workstream 7	**Enhancing productivity of existing assets**
Priority Action 7b	**Use new technology to improve infrastructure efficiency**

Barriers / Risks and proposed measured to address

Barriers and Risks	Measures to address	Progress
Agencies may not have capability to identify the projects in need of improvement	Develop criteria to guide agencies in identifying suitable assets	
Existing projects may be operating under long term concession contract which are difficult and expensive to interfere with	Engage with concessionaire early to justify the use of never technology	
Changing the configuration or use of existing assets may not be feasible or in the public interest, or could cause significant disruption	Project selection process and pre-feasibility study to include consideration of the impact on public during implementation of the improvement measure	
New technologies can be expensive and unproven	Pre-feasibility study should include a cost benefit analysis to outline the cost of new technology versus benefit of improved productivity. Utilise technology from reputable and proven providers	
Operational challenges faced by existing asset owners/operators faced with using new technologies	Technology providers should be required to provide long term training and support	

Key sub-action items

Key sub-action items	Timing	Action owner	Progress
Identify list of infrastructure assets which are performing sub-optimally	Month 1 – 2	Lead implementing agency for each sector	
Shortlist and identify one pilot project which clearest potential for productivity improvement	Month 3	National infrastructure planning agency	
Initiate discussion with the key technology providers for the pilot project to inform scoping of the improvement project	Month 4 – 6	Implementing agency for pilot project owner	
Complete the pre-feasibility study to access the cost, benefits and feasibility of the improvement project	Month 6 – 12	National infrastructure planning agency	
Initiate competitive procurement process of the improvement project	Month 13 – 18	Implementing agency for pilot project owner	
**The above should consider any capacity building needs to facilitate the outcomes*			

Support required

AMS resource needs:

- Lead to drive this priority action — [*Senior member from National infrastructure planning agency*]
- Support staff to coordinate between the lead implementing agencies & technologies providers — [*Senior / middle level members from National infrastructure planning unit*]

Other support:

- Suitable consulting firm to support through the pilot project collection process and completion of the pre-feasibility study

Outcomes

Benefits:

- Long term cost savings by making an early investment in newer technology
- With success of the pilot project, potential to roll out new technology on other projects performing sub-optimally

KPI / Metrics:

- Metric 1: Achievement of milestone sub-action against intended timeline
- Metric 2: Approval of pre-feasibility study for pilot project within 12 months
- Metric 3: Actual annual cost savings compared to the estimate (from the cost benefit analysis)
- Metric 4: Actual improved output of the asset compared to the estimate (from the cost benefit analysis)

Annex E – Toolkit 1 Template

a. Toolkit 1 template. Prioritisation Toolkit: Workstream 1

	Workstream 1: Infrastructure Planning Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	The institutional framework within government for overseeing the planning and implementation of infrastructure is well understood, and government agencies (central, subnational and local) understand their roles and responsibilities for implementing the National Infrastructure Strategy.					[3]		
2	There is effective communication between government stakeholders at different levels of government which means that infrastructure planning and implementation proceeds in a coordinated manner					[3]		
3	Sector master plans are developed in a coordinated way and are aligned with the country's economic vision and the National Infrastructure Strategy					[3]		
4	Agencies responsible for Infrastructure sectors are set outcome-based medium term infrastructure goals which are aligned with the country vision for economic growth and development.					[2]		

	Workstream 1: Infrastructure Planning Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
5	The framework and procedures for screening, selection and prioritisation of infrastructure projects are effective and are well understood by the approving and implementing agencies.					[3]		
6	There are established procedures for dealing with unsolicited proposals and these include considering how the project aligns with the National Infrastructure Strategy.					[2]		
						Total Score		
						Maximum Total Score**	[48]	
						Score as a percentage		

* AMS may adjust the Weightings based on their own assessment of areas that would make a meaningful difference in the context of their country.
** Maximum Score is calculated as the sum of all the weightings multiplied by the maximum score for an individual statement (3).

b. Toolkit 1 template. Prioritisation Toolkit: Workstream 2

	Workstream 2: Knowledge Sharing Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	Business Cases / Pre-Feasibility Studies for major new projects include robust demand assessments which draw on expert studies taking into account both up to date existing data and future influences.					[3]		
2	Relevant agencies systematically collect meaningful and useful data on the condition of existing assets					[2]		
3	Relevant agencies systematically collect data on traffic / patronage / use of existing assets					[3]		
4	Data is processed and shared via platforms easily accessed by other government agencies and other stakeholders (e.g. developers, operators, and end users)					[2]		
5	For new infrastructure projects that are being implemented, reporting and data collection procedures are well-established and agencies have sufficient resources to monitor progress and contractor performance.					[3]		
						Total Score		
						Maximum Total Score**	[39]	
						Score as a percentage		

c. Toolkit 1 template. Prioritisation Toolkit: Workstream 3

	Workstream 3: Public Investment Management Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	Infrastructure projects have not been halted midway through construction due to insufficient funding.					[3]		
2	Relevant government agencies responsible for infrastructure assets systematically identify and plan for periodic maintenance and replacement requirements.					[3]		
3	Relevant government agencies include a line item within their budget for maintenance activities and this is typically enough to cover essential maintenance requirements.					[3]		
						Total Score		
						Maximum Total Score**	[27]	
						Score as a percentage		

d. Toolkit 1 template. Prioritisation Toolkit: Workstream 4

	Workstream 4: Streamlined Project Implementation Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	Effective risk management frameworks are typically employed from the early stages of project inception, and these risk management frameworks have enabled early identification of key risks such that mitigation measures have been put in place.					[3]		
2	Environmental and social impact assessments are routinely carried out at the pre-feasibility stage for infrastructure projects					[3]		
3	When selecting contractors or private sector partners (for PPP contracts), assessments are carried out on their capability, track record, and financial standing and these assessments are considered in the selection process.					[3]		
4	The principles and benefits of PPP contracts and Output and Performance Based Contracts (OPBC) are well understood and government agencies routinely consider these forms of contract for delivering their infrastructure projects.					[3]		
5	Government agencies have established procedures and required capability for responding to unsolicited proposals. These procedures include subjecting the proposal to competition from other bidders.					[3]		

	Workstream 4: Streamlined Project Implementation Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
6	Government agencies are well equipped for managing major infrastructure contracts, both during construction and also during operations (for PPP or long term OPBC contracts)					[3]		
						Total Score		
						Maximum Total Score**	[54]	
						Score as a percentage		

e. Toolkit 1 template. Prioritisation Toolkit: Workstream 5

	Workstream 5: Post implementation reviews Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	Formal procedures are in place for reviewing how a project has been implemented or and for capturing lessons learned for future improving outcomes on future projects.					[3]		
2	Government agencies learn from their experiences on previous projects and implement changes that improve project outcomes.					[3]		
3	Government agencies are held accountable for responding to lessons learned and feedback.					[2]		
4	Feedback and recommendations are sought from donor agencies and development banks when they carry out their own reviews of projects that they have funded.					[2]		
						Total Score		
						Maximum Total Score**	[30]	
						Score as a percentage		

f. Toolkit 1 template. Prioritisation Toolkit: Workstream 6

	Workstream 6: Enhancing market capabilities Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	The local construction market is well served by a number of large domestic construction contractors of good standing and international reputation.					[3]		
2	Domestic construction contractors adhere to international recognised standards					[2]		
3	Local banks are active in the infrastructure sector and have the capability to lend on a project finance basis.					[2]		
						Total Score		
						Maximum Total Score**	[21]	
						Score as a percentage		

g. Toolkit 1 template. Prioritisation Toolkit: Workstream 7

	Workstream 7: Enhancing productivity of existing assets. Statement	Disagree (0 points)	Partially Agree (1 point)	Mostly Agree (2 points)	Strongly Agree (3 points)	Weighting* (1, 2 or 3)	Score (Points x Weighting)	Comments / Observations
1	There are requirements for pre-feasibility studies to consider alternative means of meeting a project need. For example, enhancing existing infrastructure or implementing strategies for better managing the demand for existing infrastructure.					[3]		
2	Major infrastructure assets are already making use of new technologies and digital solutions to enhance their effectiveness and productivity.					[2]		
3	Infrastructure assets across sectors are operated and maintained in a way that enables them to achieve optimal utilisation.					[3]		
4	When assets are performing sub-optimally and their productivity is impacted, remedial actions are implemented in a timely manner to address these performance issues.					[2]		
						Total Score		
						Maximum Total Score**	[30]	
						Score as a percentage		

Annex F – Toolkit 2 Template

Workstream [x]	**[Workstream]**
Priority Action [x]	**[Priority action]**

Barriers / Risks and proposed measured to address

Barriers and Risks	Measures to address	Progress
[Barrier / Risk]	[Measures]	[Progress]
[Barrier / Risk]	[Measures]	[Progress]
[Barrier / Risk]	[Measures]	[Progress]
[Barrier / Risk]	[Measures]	[Progress]
[Barrier / Risk]	[Measures]	[Progress]

Key sub-action items

Key sub-action items	Timing	Action owner	Progress
[Sub-action]	[Month / Year etc]	[Action owner]	[Progress]
[Sub-action]	[Month / Year etc]	[Action owner]	[Progress]
[Sub-action]	[Month / Year etc]	[Action owner]	[Progress]
[Sub-action]	[Month / Year etc]	[Action owner]	[Progress]
[Sub-action]	[Month / Year etc]	[Action owner]	[Progress]
**The above should consider any capacity building needs to facilitate the outcomes*			

Support required

AMS resource needs:

- [Lead to drive this priority action] — [*Senior member from XX agency*]
- [Support staff] — [*Senior / middle level members from XX unit*]

Other support:

- [Other support]

Outcomes

Benefits:

- [Qualitative & quantitative benefits]

KPI / Metrics:

- [Metric 1 : XX]
- [Metric 2 : XX}
- [Metric 3 : XX]
- [Metric 4 : XX]

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