

CHAPTER

9

National Roads

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the Quality of Spending

This chapter is part of the World Bank's 2020
Public Expenditure Review for Indonesia.

CHAPTER AUTHORS

Elena Chesheva
Elisabeth Goller
Tomás Herrero Díez
William D. Paterson

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Key Messages

- A** National roads and expressways (i.e., roads managed by the central government) are strategically important to Indonesia's productivity and competitiveness, carrying 40 percent of all traffic.
- B** Although public spending on national roads has increased over the past decade, growth in the national road network has not kept pace with growing demand. Nearly two-thirds of vehicle-km travelled on national roads is under slow or congested flow conditions.
- C** The increase in public spending has mostly financed the use of more expensive treatments, leading to higher road development and preservation costs. However, the quality of national roads has not improved in a meaningful way if measured by international standards.
- D** Poor data collection and management systems have led to fragmented and ineffective program prioritization. Moreover, the highly decentralized nature of the Directorate General of Highways (DGH) has hampered the quality and speed of implementation of national road projects.
- E** The Expressway Development Program (EDP) is on track, but the Gol relies heavily on state-owned enterprises (SOEs) to execute new projects. This model risks creating contingent liabilities and crowding out of the private sector.

Summary of Recommendations

Some improvements have recently taken place: the share of work with large contract sizes has increased; recently-launched legislation is expected to encourage the implementation of performance-based contracts; and Balai/regional offices are starting to use more modern expenditure planning tools. The remaining agenda of reforms includes:

- A** Focus on efficiency and effectiveness rather than quantity:
 - Redefine strategic transport indicators to include efficiency and road safety indicators;
 - Revisit the current condition rating and establish new, internationally-aligned roughness thresholds, as well as strengthening project design/supervision, quality control and compliance with vehicle load capacity restrictions; and
 - Monitor expenses more closely to ensure the higher costs of road treatments and lifecycle costs are justified.
- B** Develop longer-term strategies to address the backlog in road network capacity, such as by refocusing the current short-term widening program on longer-term objectives (e.g., higher geometric standards, safer infrastructure) and by developing a long-term (about 50-year) funding strategy for expressways to account for the anticipated need of greater public investment.
- C** Increase the pool of funding for national roads and expressways, including by leveraging private sector investment; however, when insufficient fiscal resources are available, it is recommended that the Gol prioritizes asset preservation over new investment.
- D** Address institutional challenges to implementing reforms, specifically by revisiting the structure of the DGH to improve the concentration of technical skills and better focus the responsibilities of staff on asset management.

Further key reading

Infrastructure Sector Assessment Program (World Bank, publication forthcoming), Chapter 3 "Transport".

Road Sector Public Expenditure Review (World Bank, 2012). <https://www.worldbank.org/en/news/feature/2013/02/12/investing-in-indonesia-roads-improving-efficiency-and-closing-the-financing-gap-road-sector-public-expenditure-review-2012>

9.1

Context

Indonesia's road infrastructure is critical to its economic growth, competitiveness and productivity. In 2017, the total length of the classified road network in Indonesia was reported to be 532,837.9 km, the bulk of which is managed at the district (80.5 percent) and the provincial levels (10.5 percent). Only 60 percent of these subnational roads are paved, and a significant share are not deemed to be in good condition (Table 9.1). Roads managed by the central government—national roads and expressways—are generally in better condition, with over 90 percent of them being paved and in stable condition. While all segments of the road network deserve attention, this chapter focuses on the efficiency and effectiveness of public spending on national roads and expressways, given their extensive utilization and strategic importance. Although these roads only account for 9 percent of the total network, they carry nearly 40 percent of the traffic.

Over the past decade, demand for road transport in Indonesia has outpaced economic growth. Between 2012 and 2017, national road transport demand grew by 8.7 percent per year to 134.9 billion vehicle-km per year (Figure 9.1). This outpaced average GDP growth of 5.3 percent per year during the period. As the Indonesian economy and the emerging middle class continue to

expand, the trend of increasing road transport is expected to continue. In addition, the current level of motorization measured as motor vehicles per 1,000 people (excluding motorcycles) is still relatively low in Indonesia (87) compared with neighboring countries such as Thailand (206) or Malaysia (361).²²⁰

The national road network has not kept pace with growing demand, leading to a backlog of road network capacity. Although the length of the national road network has been extended by 3.7 percent annually over recent years (Figure 9.1), this is mostly due to the reclassification of existing roads, rather than the construction of new roads. In 2014, only 3 percent of additional national roads had been newly built, while 86 percent came from the reclassification of provincial roads. As a result, the current backlog of network capacity is estimated at about 17,000 lane-km of road space.²²¹ It is estimated that 4,000–7,000 lane-km needs to be added annually to cater for the above-mentioned increase in traffic demand.

Poor connectivity and high transport costs have negatively affected Indonesia's productivity and competitiveness. As Figure 9.2 indicates, Indonesia lags regional peers on international indices of transport infrastructure and logistics performance. Indonesia is ranked 75 out of 140 countries in terms of the quality of roads on the 2018 Global Competitiveness Index, behind Malaysia (20), China (42), India (51) and Thailand (55). Indonesia ranks 46 out of 163 countries on the World Bank's Logistics Performance Index (LPI) in 2018, behind the same set of countries and even Vietnam (39). About 16 percent of firms identify transport as a major constraint, 1.0 percentage point higher than the regional average.²²²

The GoI has outlined ambitious targets to improve national roads and expressways. These include accelerating the construction of a Multimodal Transport System and a National Logistics System that integrate not only the main economic corridors, but also newly growing areas. To achieve these objectives, the Directorate General of Highways (DGH), part of the Ministry of Public Works and Housing (MoPWH) (see Box 9.1), envisages constructing 4,185 km of national roads and expanding the toll-road network by 30.4 percent over the period 2014–19. The DGH also aims to decrease the travel time on main corridors and halve the number of road traffic accidents between 2010 and 2019.²²³ As of 2018, the GoI had nearly achieved most of its output targets, but remained far from its targets for better outcomes in the sector (Table 9.2).

Tackling inefficiencies in public spending on national roads and expressways could help the GoI to meet these targets, including by attracting more private investment in the sector. Reducing the backlog and keeping up with demand for national road transport will require improving the quality of spending and possibly increasing the overall investment in the sector. Since it is not possible for public resources to finance all the necessary investments, it is critical to leverage more private investment. The subsequent sections discuss how the quality of public spending on national roads and expressways can be improved to achieve this objective.

TABLE 9.1. Most roads are managed by SNGs, but national roads carry 40 percent of traffic

Administrative status	Length (km)	Share of total by length (percent)	Percent of roads paved	Good & fair condition (percent of all roads in category)	Bad & poor condition (percent of all roads in category)
National	47,017.3	8.8	96	92	8
Provincial	55,841.3	10.5	79	68	32
District	428,786.3	80.5	60	57	43
Expressways*	1,475.0	0.2	100	100	0
Total/average	533,119.9	100.0	65	62	38

*Expressways refer to toll roads that are also managed by the central government

Source: Directorate General of Highways (DGH) and Ministry of Public Works and Housing (MoPWH).

²²⁰ Footnote: World Road Statistics, 2017. Data refer to 2015. The motorization level including motorcycles is much higher at 495 vehicles per 1,000 people.

²²¹ See Annex for more details on how these numbers were derived.

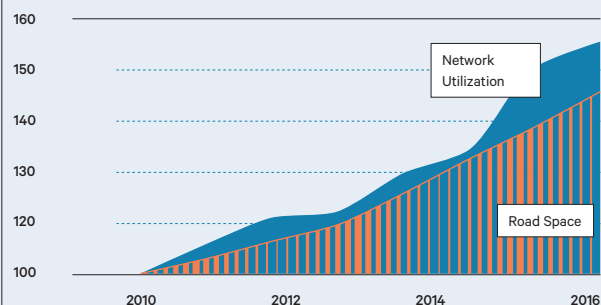
²²² World Business Environment Survey (WBES) 2015.

²²³ This safety target was envisaged in the Ministry of Transport Renstra 2015–2019.

FIGURE 9.1.

Road transport demand has outstripped network capacity, creating a backlog...

Indices of road space and network utilization (2010=100)

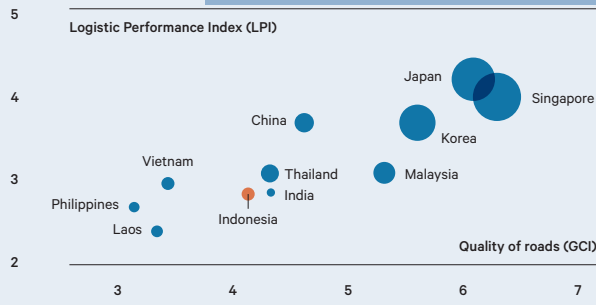


Source: World Bank staff calculations from DGH Annual report (LAKIP), 2009-17, and *Pagu Anggaran TA* and DGH IRMS database.

FIGURE 9.2.

...that has led Indonesia to fall behind on indices of competitiveness

LPI (infrastructure) vs. GCI (road infrastructure quality) in 2018 and GDP per capita (2017)



Source: World Economic Forum Global Competitiveness Report and the World Bank's Logistics Performance Index.

Note: Bubble's size is proportional to GDP per capita.

TABLE 9.2.

The GoI is close to achieving most of its targets for outputs, but not for outcomes

		Baseline (2014)	Achieved (2018)	Target (2019)
Outputs	National roads (km)	47,017.3	50,404.0	51,202.3
	Expressways/toll roads (km)	813	1,193	1,060
	Preserving/maintaining existing roads (km)	60	57	43
Outcomes	Connectivity/travel time on main corridors (hour/100 km)	2.7	2.6 ²²⁴	2.2
	Road in stable condition (percent)	94.0	91.9	98.0

Source: DGH Strategic Plan (Renstra) and LAKIPs 2015-18.

BOX 9.1.

Who manages national roads and expressways?

The MoPWH is responsible for the development and management of national roads and expressways. National roads are under the Directorate General of Highways (DGH, or Bina Marga), while expressways are under the Indonesia Toll Road Regulatory Authority (BPJT).²²⁵ The DGH comprises five directorates, 18 Balai offices, and an additional office to support bridges and tunnels (BJKT). BPJT is responsible for implementing the Expressway Development Program (EDP)—recommending tariffs, conducting toll-road investments under PPP schemes, and monitoring the construction and operation of toll roads (Figure 9.3). While

BPJT has some budget for its daily activities, it does not manage the budget related to project development and operations.

Organization of the DGH is highly decentralized, with only 10 percent of employees located centrally and the remaining 90 percent distributed among the *Balai* offices. The 2015 reorganization of the DGH structured the central office around output sub-programs, instead of business processes, and delegated primary responsibility for program preparation and project delivery to the local Balai offices. Such offices are relatively autonomous, reporting directly to the Directorate General. They are responsible for project identification, design and implemen-

tation. Responsibility for budget execution is assigned through a parallel structure of Satker (work units) and PPK appointed by the minister. Technical policies and coordination for each sub-program are directed by the central “competency” directorate.

In early 2019, the GoI created the new Directorate General of Infrastructure Financing (DGIF) under the MoPWH. The DGIF will be responsible for securing adequate and optimum financing arrangements for all roads being/going to be developed as PPPs, either as part of the EDP or the national road network.

Source: Authors based on various Presidential and Ministerial Regulations and LAKIP 2017 (DGH).

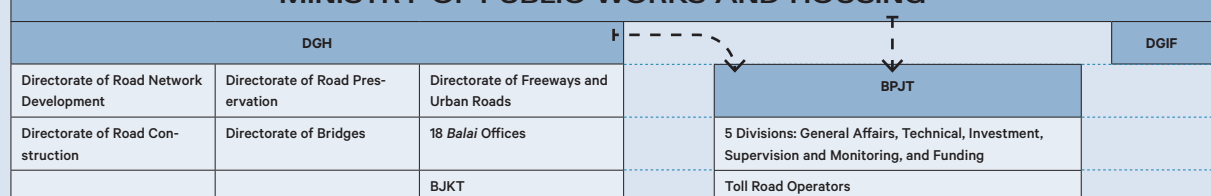
²²⁴ This value refers to 2017. In the reviewed Renstra, issued in August 2018, connectivity is no longer measured as the travel time on main corridors, but as the percentage of connected nodes due to road development and preservation activities (89.7 percent in 2018).

²²⁵ The DGH's functions and organization are regulated by Presidential Regulation No. 15/2015, and Ministerial Regulations No.15/PRT/M/2015 and No.34/PRT/M/2015. BPJT was established by Ministerial Regulation No.29/5/PRT/M/2005 and amended by MPWH Regulation No.15/2014.

FIGURE 9.3.

Institutional arrangements for the national road and expressway subsectors in Indonesia

MINISTRY OF PUBLIC WORKS AND HOUSING



9.2

Assessing the Quality of Spending

A

Overall Trends: Is Spending Adequate?

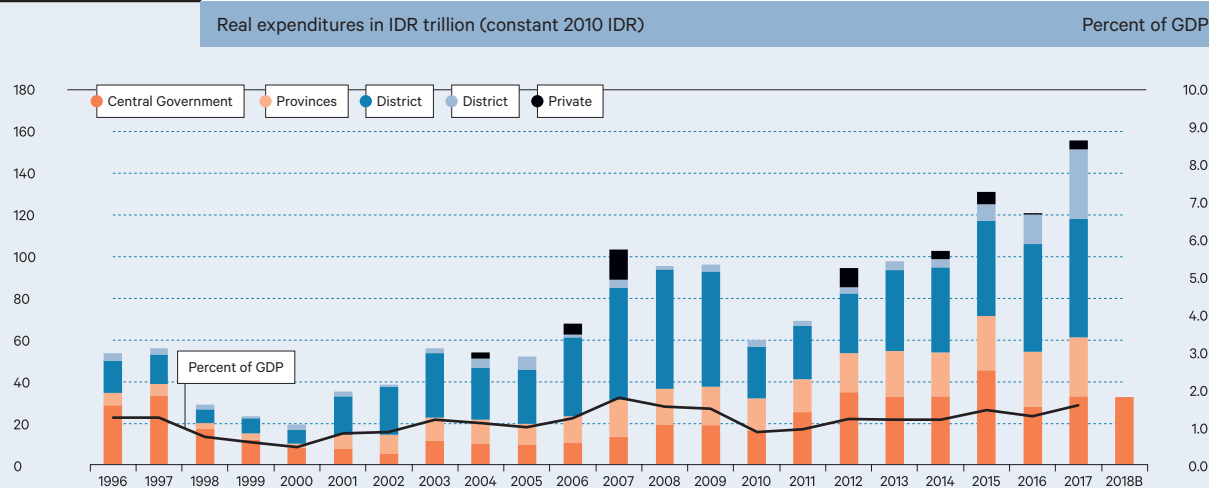
The roads sector in Indonesia has suffered from years of underinvestment. From 1996 to 2017, total public and private investment in all types of roads²²⁶ averaged 1.1 percent of GDP (Figure 9.4). SNGs have historically accounted for the bulk of total spending since decentralization (about 60 percent), followed by the central government (30 percent), state-owned enterprises (SOEs), and the private sector.

However, central government spending on national roads and expressways has risen substantially over the past decade. Central government spending on national roads fell after the Asian financial crisis and remained low until the mid-2000s, but it increased 8.4 percent per year in nominal terms since 2007 to IDR 44.8 trillion in 2017.²²⁷ In recent years, spending on preservation²²⁸ has received greater attention

- A** Overall Trends: Is Spending Adequate?
- B** How Efficient Is Public Spending in the Sector?
- C** How Effective Is Public Spending in the Sector?

FIGURE 9.4.

Total investment in roads has been low as a share of GDP, but central government spending has increased over the past decade



Note: 2018 refers to budget allocation from the central government; other data are not available. Subnational data for 2015-17 should be interpreted with caution: data for 2015 and 2016 are estimates of the total budget for infrastructure at the subnational level, (footnote 229) whereas data for 2017 are extrapolated using 2013-16 compound annual average growth.

Source: Ministry of Finance (MoF) for central and subnational governments, annual reports for SOEs, World Bank PPI database for private investment; World Bank and PROSPERA staff calculations.

²²⁶ Refers to all roads since there is no detailed breakdown by type of road network for subnational, private and SOE investment.

²²⁷ Last year of available audited, actual spending data. In 2018, the central government budgeted IDR 46.8 trillion for national roads (IDR 32.2 trillion in real terms).

²²⁸ Road preservation refers to routine and periodic maintenance, minor and major rehabilitation and reconstruction works.

²²⁹ Specifically, it is assumed that spending on roads is equivalent to 74 and 50 percent of total province and district infrastructure spending, respectively. This is based on a sample of 10 SNGs used for case studies in the World Bank Road Sector Public Expenditure Review (2012).

to sustain more extensive road and bridge networks (Figure 9.5). Spending on preservation increased from 37 percent in 2015 to 49 percent of total expenditure on national roads in 2018. Meanwhile, spending on the development of roads,²³⁰ bridges, strategic roads and expressways fell from levels of 57 percent between 2005 and 2015 to 34 percent in 2018.

Despite increases in spending, central government spending on national roads and expressways is still slightly below the needed amount to meet demand growth and GoI targets.²³¹ The central government budgeted IDR 45.8 trillion for national roads in 2018 and IDR 44.1 trillion in 2019. However, annual public investment needs for the national road sector are estimated at IDR 47.5-51 trillion.²³² This encompasses IDR 19-20 trillion for road development, IDR 16.5-19 trillion for asset preservation, and IDR 12 trillion for the expressway program (excluding IDR 20 trillion of private sector and SOE investment). Hence, the budget allocation for national²³³ roads is still about IDR 2-6 trillion below the needed public investment level.

Development of the next phase of the Expressway Development Program (EDP) will require substantial funding from the central government. Since the Asian financial crisis, the toll-road network has increased by only 3 percent per year. As a result, Indonesia has fewer kilometers of expressways per million inhabitants than most of its neighbors (Table 9.3). The EDP, developed by BPJT, aims to build around 6,486 km of expressways by 2034. More than one-third of this target, or 2,349 km of toll roads, is either already in operation or under construction. As for the remainder, BPJT intends to build km in the upcoming National Medium-Term Development Plan (2020-2024), and subsequently the balance in two phases (2,370 km from 2025-29 and 133 km from 2030-34). In contrast to the first 2,349 km tranche of roads, which was mostly financed through user fees, most of these upcoming expressway projects will require some form of government support (in the form of Viability Gap Financing, guarantees, annuities or availability-based payment methods). This is because they are expected to carry less traffic and thus be less profitable for toll-road concessionaires.



Annual public investment needs for the national road sector are estimated at IDR 47.5-51 trillion

²³⁰ Road/bridge development refers to construction of new assets and widening works.

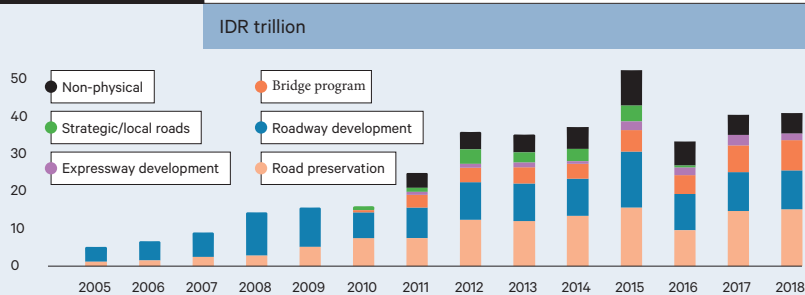
²³¹ As stated in the 2025 RPJPN (Rencana Pembangunan Jangka Panjang Nasional) and the draft 2034 Long-Term Master Plan of the National Road Network.

²³² See annex for description of how these costs were calculated.

²³³ According to the draft 2034 Long-Term Master Plan of the National Road Network.

FIGURE 9.5.

In recent years, road preservation has received a greater portion of the central government spending



Note: Non-physical outputs include data collection; technical planning and programming; RPJMN and Renstra preparation; project M&E; land acquisition support; preparation and revision of environmental and social documentation; regional road support; quality testing; capacity building programs; maintaining e-monitoring systems; and other office services.

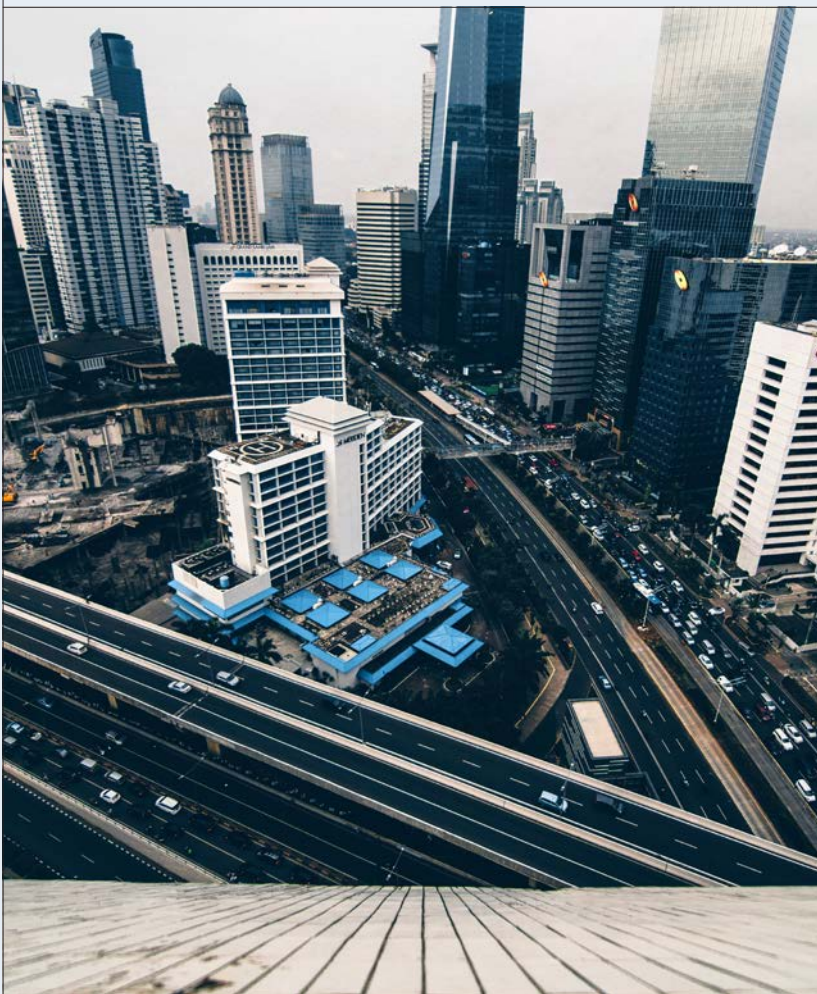
Source: MoF and DGH. Based on audited expenditures except for 2018, which refers to planned budget expenditures.

TABLE 9.3.

Indonesia has lower expressway density than most of its neighbors

	Indone- sia	Malay- sia	China	India	Viet- nam	Philip- pines
Length (km)	1,745	2,021	136,500	24,000	2,150	286
Density (km/million inhabitants)	6.75	63.75	98.72	18.33	23.22	2.74

Source: Indonesia – BPJT, 2018; Malaysia – ASEAN Statistics, 2016; China – Transport Transformation and Innovation Knowledge Platform (TransFORM), 2017; India and Vietnam – World Bank Country Offices, 2017; Philippines – Department of Public Works and Highways (DPWH), 2018; Population: World Economic Forum (2017-18).



B

How Efficient Is Public Spending in the Sector?

Despite increased central government spending on national roads, physical output has not increased commensurately with expenditure. Road development has stayed relatively constant at around 2,000 to 3,000 km per year. Effective preservation²³⁴ output surged from about 1,400 km in 2010 to over 4,000 km in 2012 but has also mostly declined since then (Figure 9.6). Instead, higher spending appears to have financed an increase in road development and preservation costs, which rose by 40 percent in 2015 (Figure 9.7). This is partly due to more expensive treatments due to the use of higher design standards²³⁵ and concrete pavements on trunk corridors. While such expenses may be justified in reducing long-term lifecycle costs, there may be other factors driving cost increases that warrant further examination.

Even where road development has occurred, the network has been unevenly distributed throughout the country's main islands. Java and Bali are the most accessible islands, with 0.053 km of roads for every kilometer squared (km²) of land, but they also have the greatest demand for arterial capacity (Figure 9.8).²³⁶ The latter can be seen in the fact that they have the lowest national road-to-population and road-to-gross regional domestic product (GRDP) ratios: 0.005 km per 10,000 habitants and 0.001 km per IDR billion, respectively. Meanwhile, eastern Indonesia (the islands of Papua, Maluku, East and West Nusa Tenggara) is less accessible, with only 0.017 km of roads per km² of land, but density is high relative to demand and population (0.023 km per IDR billion and 0.058 km per 10,000 people, respectively).

The GoI has mostly relied on SOEs to expedite implementation of the EDP, but this may not be the most efficient strategy. While there has been some progress in recent years using PPP schemes for expressway development, the SOE PT Jasa Marga continues as the dominant player, operating more than half of all toll roads. While relying on SOEs has contributed to BPJT's ability

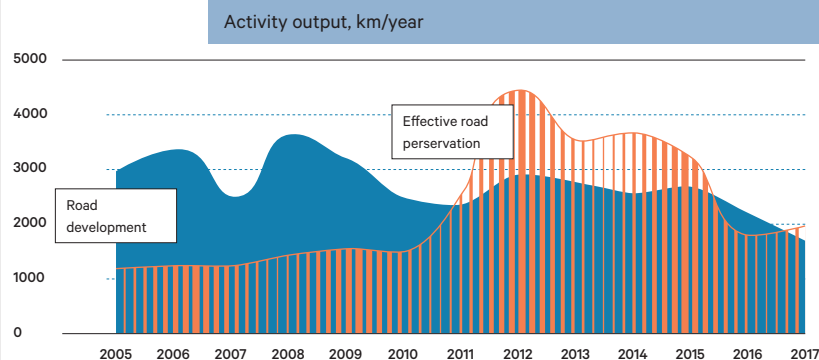
²³⁴ Effective preservation includes the treatments which are applied to road sections for which the DGH defines an "effective length". These include all the preservation treatments except routine maintenance.

²³⁵ In 2012, the DGH upgraded the design standard, doubling the rehabilitation life from 5 to 10 years and pavement life to 20 years. This implies a rehabilitation and reconstruction coverage of 10 percent annually to keep pace with deterioration.

²³⁶ The national road network comprises 38.6 percent of arterial roads and 61.4 percent of collector roads. While arterial roads serve long-distance transport movements with high average speeds and restricted side access, collector roads serve collection/distribution movements over medium distances with intermediate speeds and with some restriction on side access.

FIGURE 9.6.

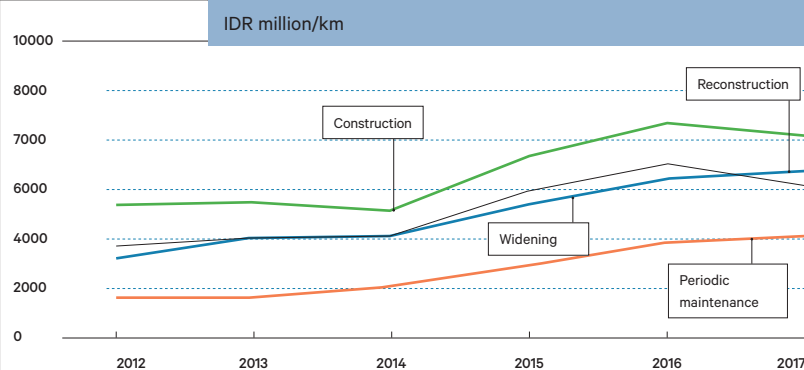
Real increases in spending have not financed increases in physical road output...



Source: DGH, World Bank staff calculations.

FIGURE 9.7.

...but instead financed more expensive treatments

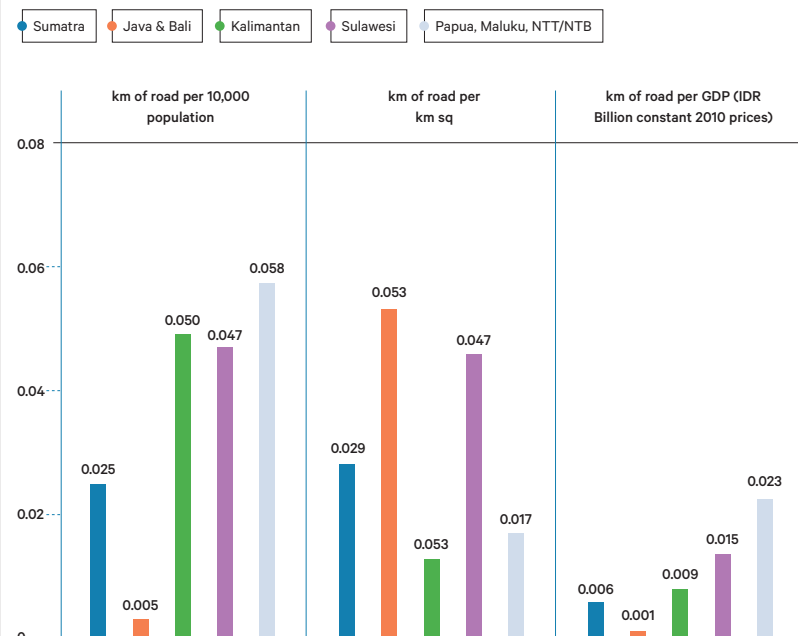


Source: DGH, World Bank staff calculations.

Note: Road development refers to road construction and widening, while road preservation refers to periodic maintenance and road reconstruction.

FIGURE 9.8.

More arterial roads are needed in Java and Bali, but more roads per land area are needed to improve accessibility in outer islands



Source: DGH and Bureau of Statistics of Indonesia (BPS), 2017.

to exceed the target for building toll roads (Table 9.2), it may not be the most sustainable or efficient option for developing 4,218 km of expressways that have not yet been awarded or assigned. This is because, in numerous cases, projects assigned to SOEs require GoI support to reach viability at entry or sustain viability during the operation of the concession, or both. Moreover, the majority of SOEs capable of taking new road concessions are already highly leveraged and may not have capacity to raise more equity or debt without more explicit government subsidies, which would increase the fiscal risks from contingent liabilities. Indeed, the liability-to-equity (LE) ratio for major SOEs involved in the sector has been increasing (Table 9.4) and is more than twice as high as the average LE ratio for comparable private firms in emerging markets.²³⁷ Inadequate project planning, preparation and packaging, the lack of a comprehensive, reliable funding envelope and other uncertainties may have dampened interest from prospective private sector bidders.²³⁸

How Effective Is Public Spending in the Sector?

Given the backlog on the national road network, travel speeds are unsurprisingly slow throughout Indonesia.

Road travel speeds are relatively low on the national road network, at about 40km/hr. This is attributable to low geometric standards,²³⁹ a high “volume-to-capacity ratio” (VCR)²⁴⁰ on main corridors, fair road conditions, extensive ribbon development,²⁴¹ and other land use issues along the road rights of way. Moreover, the lack of direct road connections between areas of economic activity translate into excessively long journey times. Traveling a mere 100 km can take nearly 3

hours in the six main economic corridors (Figure 9.9).

In addition, nearly two-thirds (63 percent) of vehicle-km traveled on national roads in Indonesia are under slow or congested flow conditions, i.e., less than 50 percent of free-flow speeds. Thirty-eight percent of all travel on Indonesia’s roads occurs in ‘very congested’ or ‘highly congested’ flow conditions (VCR > 1.0). This issue is particularly prevalent on major roads in arterial corridors: traveling on over 50 percent of multi-lane highways (1,300 km) occurs in ‘slow’ or ‘congested’ flow conditions (Figure 9.10).

TABLE 9.4.

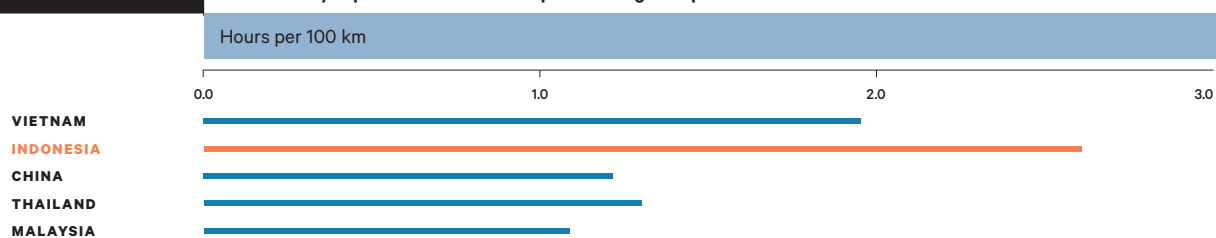
The liability-to-equity ratio of SOEs involved in expressway development has risen in recent years

	2014	2015	2016	2017
PT Jasa Marga	1.8	2.3	2.3	3.3
PT Waskita Karya	3.4	2.2	2.7	3.3
PT Hutama Karya	5.0	1.3	2.2	4.7
Average	3.4	1.9	2.4	3.8

Source: Audited accounts of the central government in 2017, MoF (2018).

FIGURE 9.9.

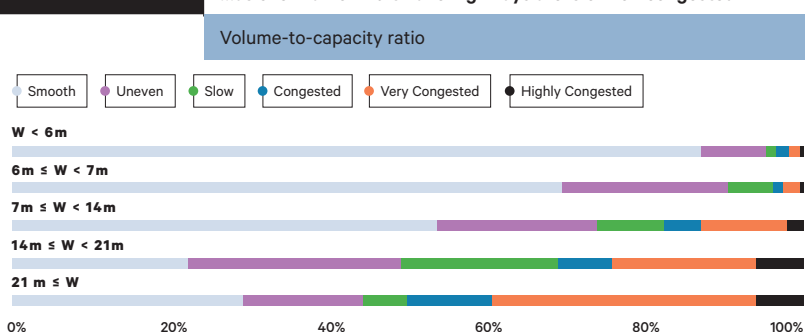
Connectivity is poor in Indonesia compared to regional peers...



Source: Modernizing the National Road Network: A Planning Framework to Improve Connectivity and Development, Indonesia Infrastructure Initiative (IndII), 2012.

FIGURE 9.10.

...as over half of multi-lane highways are ‘slow’ or ‘congested’



Note: Multi-lane highways refer to the last two categories, with road width between 14m and 21m or more than 21m. ‘W’ stands for width. Smooth is defined as VCR less than or equal to 0.3, ‘uneven’ (0.3 < VCR ≤ 0.6); Slow (0.6 < VCR ≤ 0.85); Congested (0.85 < VCR ≤ 1.0); Very Congested (1.0 < VCR ≤ 2.0); and Highly Congested (VCR > 2.0).

Source: Authors’ elaboration based on DGH data (2016).

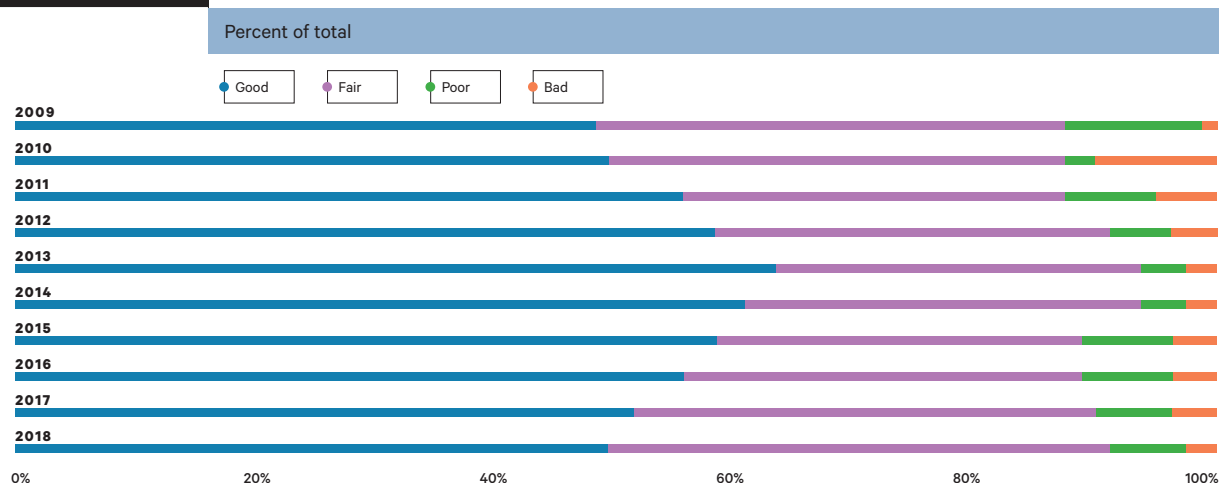
²³⁷ The book debt-to-equity ratio for firms operating in “Engineering and construction” in emerging markets in 2016 was 0.96. Source: Aswath Damodaran (<http://pages.stern.nyu.edu/~adamodar/>) based on company filings).

²³⁸ See World Bank Infrastructure Sector Assessment Program (forthcoming) for a more comprehensive discussion.

²³⁹ The majority of the arterial road network has been designed to 60km/h speeds, with only trunk roads and multi-lane facilities designed to 80 km/h speeds (compared to modern standards in the range of 80-100km/h) and collector roads have been designed to 40-60km/hr standards (compared to 60-80km/hr for normal national standards).

²⁴⁰ Volume to capacity ratio (VCR) is one of the most used indexes to assess traffic status, in which V is the total number of vehicles passing a point in one hour (volume) and C is the maximum number of cars that can pass a certain point at the reasonable traffic condition (capacity).

²⁴¹ Ribbon development consists in building houses along the routes of communications. This is prevalent along national roads in Indonesia. Part of these houses are frequently constructed within the road right of way leading to narrower sections and consequently lower speeds.

FIGURE 9.11. DGH defined 92 percent of the national road network as ‘stable’ in 2018...

Source: DG Highways.

TABLE 9.5. ...but Indonesia uses lower standards to define road condition than other emerging market countries

Road Condition	Indonesia	Georgia	Philippines	Vietnam	Peru	
					Paved	Unpaved
Good	<4	<4	1-3	<4	<2.8	<6
Fair	4-8	4-6	3-5	4-6	2.8-4	6-8
Poor	8-12	6-8	5-7	6-8	4-5	8-10
Bad	>12	100.0	*65	*62	>5	>10

Sources: Indonesia – DGH; Georgia, Vietnam, and Peru – World Bank Country Offices; The Philippines – DPWH.

Despite spending on more expensive road treatments, the quality of national roads has not improved meaningfully.

The DGH rates physical condition in terms of road roughness, measured by the International Roughness Index (m/km IRI). By this measure, 91.9 percent of the national road network was defined as ‘stable’ (*mantap*), combining ‘good’ and ‘fair’ ratings (Figure 9.11). However, Indonesia defines the threshold for stable roads as being up to 8 m/km IRI, versus 3–4 m/km IRI for ‘good’ condition and 5–6 m/km IRI for ‘fair’ condition in other countries (Table 9.5). At 8 m/km IRI, traffic speeds are greatly reduced, and reconstruction is required to reinstate the serviceability and life of the road pavement. If the threshold for stable condition were to be reduced to 5–6 m/km IRI, as per international standards, only 60 percent of Indonesia’s national road network would be considered in stable condition.

Similarly, despite the increase in spending on road preservation, the actual life and performance of roads appear relatively short and the quality is suboptimal. Ineffective supervision and poor-quality con-

trol,²⁴² inadequate pavement design,²⁴³ and weak enforcement of vehicle load capacity restrictions have resulted in the actual life of national roads being suboptimal. The low survival rate, i.e., less than five years for surfacing treatments and less than 10 years for major rehabilitation/reconstruction (for a design life of 10 years),²⁴⁴ increases budget needs to maintain serviceability. Independent technical audits to verify compliance with specifications and good practice are not systematically performed during and after contracts (see Box 9.2).

These problems with road performance are in part due to poor data collection²⁴⁵ and management systems, which have led to fragmented and ineffective program prioritization. The Indonesian Road Management System (IRMS) acts only as a database. Manual screening of pavement condition using spreadsheets is the basis to formulate the expenditure program, taking into account the historical budgets and local decisions. However, in 2016–17, the DGH and IndII developed and piloted a modern web-based Road Asset Management System (RAMS) in South Sumatra (*Balai V*), Jakar-

ta (*Balai VI*), Central Java (*Balai VII*) and East Java (*Balai VIII*). These trials showed that substantial resource savings could be obtained if such a modern system is used to formulate expenditures.

Moreover, the highly decentralized nature of the DGH has hampered the quality and speed of implementation of national roads projects. The quality assurance process has been weakened, with dispersal of technical skills and reduced review of design quality, project readiness, safeguards and implementation quality. This is acute for major projects such as expressways and road development, which warrant expert skills and tools to achieve effective designs and quality. In addition, job rotation is high (1 year 8 months per position),²⁴⁶ which is mainly intended to broad staff experience, but hinders building stable technical skills. With 17,151 employees in 2018, the staffing-to-road ratio of the DGH is among the highest in the region, reflecting an employment-intensive structure. There is a high variance between the different *Balai* offices, with the highest ratios reached in the densely populated island of Java (Figure 9.12).

242 The DGH’s project management and technical supervision model, which gives responsibility to the project manager (PPK) to control both the contractor and the supervision consultant, lead to serious shortcomings in civil works supervision with supervision consultants frequently certifying substandard work.

243 The DGH’s 2012 design standard is not systematically applied and, consequently, inadequate pavement design is persistent in many of the national road investment projects.

244 Surfacing treatments are usually performed every five years in most countries. However, in Indonesia, it needs to be carried out every two to three years. In terms of road reconstruction, it is performed every 10 to 20 years depending on the countries.

245 These data inform decisions about both road preservation and development.

246 Based on a sample of 30 permanent staff.

BOX 9.2.

Western Indonesian Road Improvement Project (WINRIP)

The World Bank-financed project WINRIP envisages the increase of the effective use of selected sections of national roads along the Western Sumatra Corridor by reducing road-user costs. Under this project, initiated in 2011, the civil works to expand the capacity of nearly 600 km of national roads are being financed.

The site visits performed by the World Bank team revealed frequent quality shortcomings in ongoing and completed road packages. Bad quality engineering designs prepared without systematically applying the relevant design standards and with insufficient attention to the actual road condition have led to frequent civil

works contract modifications, delays in work implementation and additional costs. There are serious quality shortcomings in civil works such as cracks and potholes in the wearing course or broken concrete U-ditches after less than two years since the project completion.

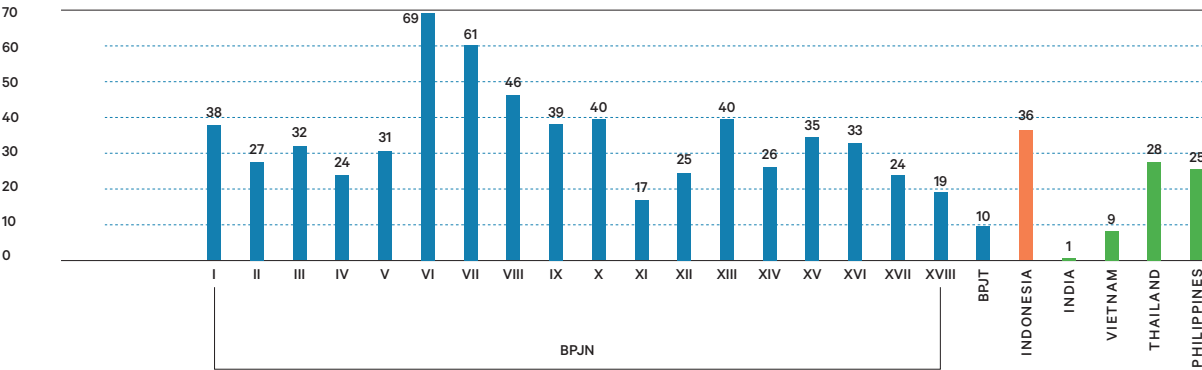
Moreover, limited attention has systematically been paid to road maintenance, road safety, environment, and worker health and safety aspects during road works execution. Independent technical audits demonstrated good results, at cost of only 0.2 percent of the civil works cost, but complete and timely follow-up of audit findings is still a major challenge.

Source: World Bank team.

FIGURE 9.12.

DGH has an employment intensive structure across its 18 Balai offices

Staff/100 km of national roads, 2018



Note: The DPWH's staff are not only responsible for national roads, but also for flood management and other infrastructures. BBPJN stands for Balai Besar Pelaksanaan Jalan Nasional and BPJN stands for Balai Pelaksanaan Jalan Nasional. BPJN I-XVII corresponds to the following cities: Banda Aceh, Medan, Padang, Palembang, Jakarta, Semarang, Surabaya, Mataram, Kupang, Banjarmasin, Balikpapan, Makassar, Palu, Manado, Ambon, Manokwari and Jayapura. BPJT is located in Jakarta.

Source: Indonesia – DGH (HR Division); India, Vietnam and Thailand – World Bank Country Offices; and the Philippines – DPWH.



9.3

Recommendations to Improve the Quality of Spending

- A** *Ensure that there is a focus on efficiency and effectiveness, rather than just quantity*
- B** *Develop longer-term strategies to address the backlog in road network capacity*
- C** *Increase the pool of funding available for national roads and expressways, including by leveraging the private sector*
- D** *Address institutional challenges to implementing reforms*

Some improvements have recently taken place in the national roads sector. First, the share of work with large contract sizes has increased, which could lead to gains in efficiency and effectiveness of spending. The consolidation of contracts has been mainly precipitated by the implementation of more advanced procurement policies. In the period 2013-17, the size of preservation contracts was increased, as the number of contracts was reduced from about 1,100 to 517, with the largest packages (i.e., those above IDR 30 billion) comprising 72 percent of spending in 2017 compared with 31 percent in 2013 (Figure 9.13). Nonetheless,

the average preservation contract remained smaller than IDR 20 billion in 2017, while the majority of the national road development contracts were above IDR 50 billion²⁴⁷ (Figure 9.14).

The GoI is encouraged to continue with the consolidation of small contracts into larger sizes of over IDR 30 billion. Such measures would increase efficiency in procurement and attract new, larger players into the market, with economies of scale and stronger quality assurance systems, which will hopefully lead to improved execution performance. Ongoing efforts should be made to assess the impact of increased contract sizes in terms of road work quality and cost.

Second, the recently launched legislation (Government Regulation (PP) No. 16/2018) enabling lump-sum remuneration schemes for a broader range of services is expected to encourage the implementation of performance-based contracts (PBCs).²⁴⁸ Previously, under regulation G.R. No. 54/2010,²⁴⁹ lump-sum remuneration schemes were only allowed for certain simple works and goods. This constrained the implementation of outcome-based payments. In the period 2010-14, the DGH piloted PBCs involving payments based on outputs and outcomes, with mixed results. In 2016, the DGH introduced long segment contracts, which are single-year contracts that combine several types of road interventions on a network of about 100 km. Several items, such as routine maintenance, were paid on the basis of outcomes.

Continuing to implement the advance procurement policy and gradually moving toward contracts with a greater outcome-based focus would improve efficiency in spending. The DGH needs to enhance the long-segment contracts, initially by including density-based performance (instead of response times), increase related penalties, and subsequently move to multi-year long-segment contracts, or some form of renewable single-year contracts. Prior experiences in Latin American and Caribbean countries has shown that contracts that are more outcome-based can lead to substantial cost savings for road agencies (of between 25 and 35 percent).²⁵⁰

Third, more modern expenditure planning tools are beginning to be utilized. The DGH is currently implementing the RAMS in all the Balai offices together with an updated version of the IRMS (IRMS v.3) at the central level. These systems will enable the DGH to evaluate and prioritize programs in each area, adjusting to changing budget scenarios, and forecasting road needs and performance for multi-year periods. The 2019 budget was formulated using these modern systems. In addition, capacity-building programs are being carried out by the DGH across all the archipelago.

The DGH is encouraged to complete the implementation of central network planning tools to replace the current ad hoc spreadsheet method. This needs to be supported by enhanced and automated data collection to improve data quality and coverage. Once these planning tools are installed, the DGH should systematically use them to formulate programs within current budget resources. Overall, the responsibility for monitoring and planning road network capacity improvements on the national road network should be assigned to the central

²⁴⁷ It should be noted that there are substantial differences among contractor's capacity across Indonesian provinces. Overall, contractors in Java, Bali or Sumatra are able to assume larger development or preservation works than the ones in eastern Indonesia.

²⁴⁸ This legislation enables lump-sum remuneration schemes for design and construction works. For more detail, please see section 2.3.2.1. a.1. of the LKPP regulation No. 9/2018 linked to the PPI6/2018.

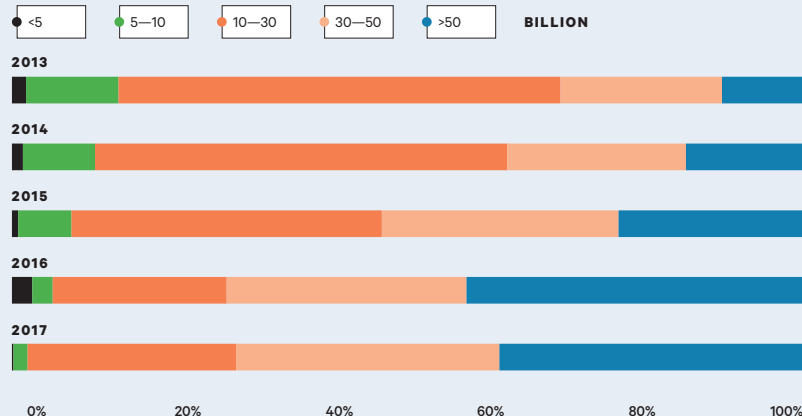
²⁴⁹ Presidential Regulation No 54/2010 (Chapter 51) issued by President Office, proposed by the National Public Procurement Agency (NPPA) or Lembaga Kebijakan Pengadaan Barang/Jasa Pemerintah (LKPP).

²⁵⁰ The World Bank has had a highly positive experience with performance-based road contracts in Brazil with the execution of CREMA—*contratos de reabilitacao e manutencao* (rehabilitation and maintenance contracts). Brazil's CREMA includes the use of performance indicators for rehabilitation and maintenance. Contractors are accountable for the road condition. Payments are linked to performance, as measured by specifically designed indicators. The evidence suggests that CREMA rehabilitation unit costs of works were 25-35 percent lower than traditional rehabilitation costs for contracts signed during the same period.

FIGURE 9.13.

The share of higher value preservation contracts has increased in recent years...

Share of preservation contracts by value, percent

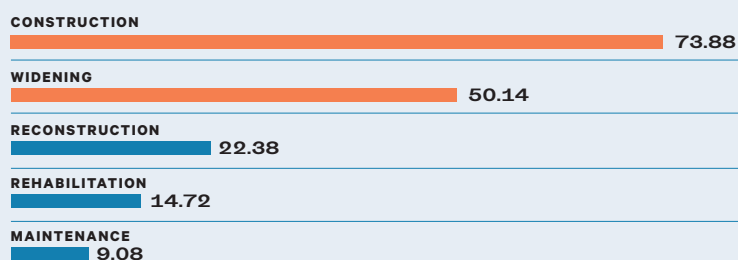


Source: DGH 2017 national road development and contract data and World Bank staff calculations.

FIGURE 9.14.

...but the average preservation contract size still remains below IDR 20 billion

Average contract size value, IDR billion, 2017

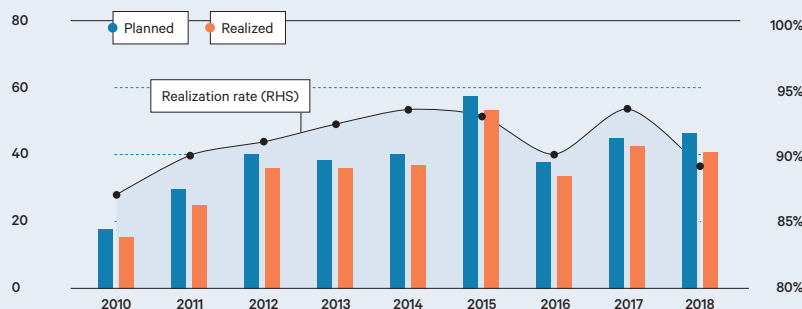


Source: DGH 2013-17 national road preservation contract data and World Bank staff calculations.

FIGURE 9.15.

DGH's budget execution mostly improved over the period 2010-17

Planned vs realized spending, IDR trillion (LHS), Percent of total (RHS)



Source: World Bank elaboration based on data from the MoF and DGH.

Directorate General of Road Network and Systems Planning.²⁵¹

Fourth, execution of the budget for national roads has improved (Figure 9.15). The DGH's budget execution rate improved from 87.4 percent in 2010 to 93.5 percent in 2017, barring a dip in execution in 2016 due to budget cuts.²⁵² The improvement is likely due to implementation of a policy for advance procurement and earlier approval of the Budget Warrant (DIPA). However, budget execution rates deteriorated to 89.3 percent in 2018, due to significant delays in the bidding process for several multi-year contracts. Moving forward, the DGH should aim to maintain high levels of budget execution.

The remaining reform agenda is as follows:

A

Ensure that there is a focus on efficiency & effectiveness, rather than just quantity

The DGH should redefine its strategic transport indicators to focus on efficiency and effectiveness, rather than quantity per se. Currently, strategic plans of the DGH do not include transport efficiency indicators, such as energy used per ton/person-km traveled by road transport, reliability of travel time (congestion index), social connectivity (mean time that people travel to access to essential services, such as health or educational facilities), air quality (emissions of air pollutants from road transport) and road traffic noise. They also do not include road safety indicators, such as road mortality (i.e., the number of road deaths per million inhabitants), road deaths per vehicle-distance traveled, road deaths by type of vehicle (heavy, light, motorcycle, bus, coach or bicycle) and by type of road user killed (driver, passenger, pedestrian or

²⁵¹ Since 2015, the DGH's reorganization, local Balai offices are in charge of project identification, preparation, implementation and monitoring.

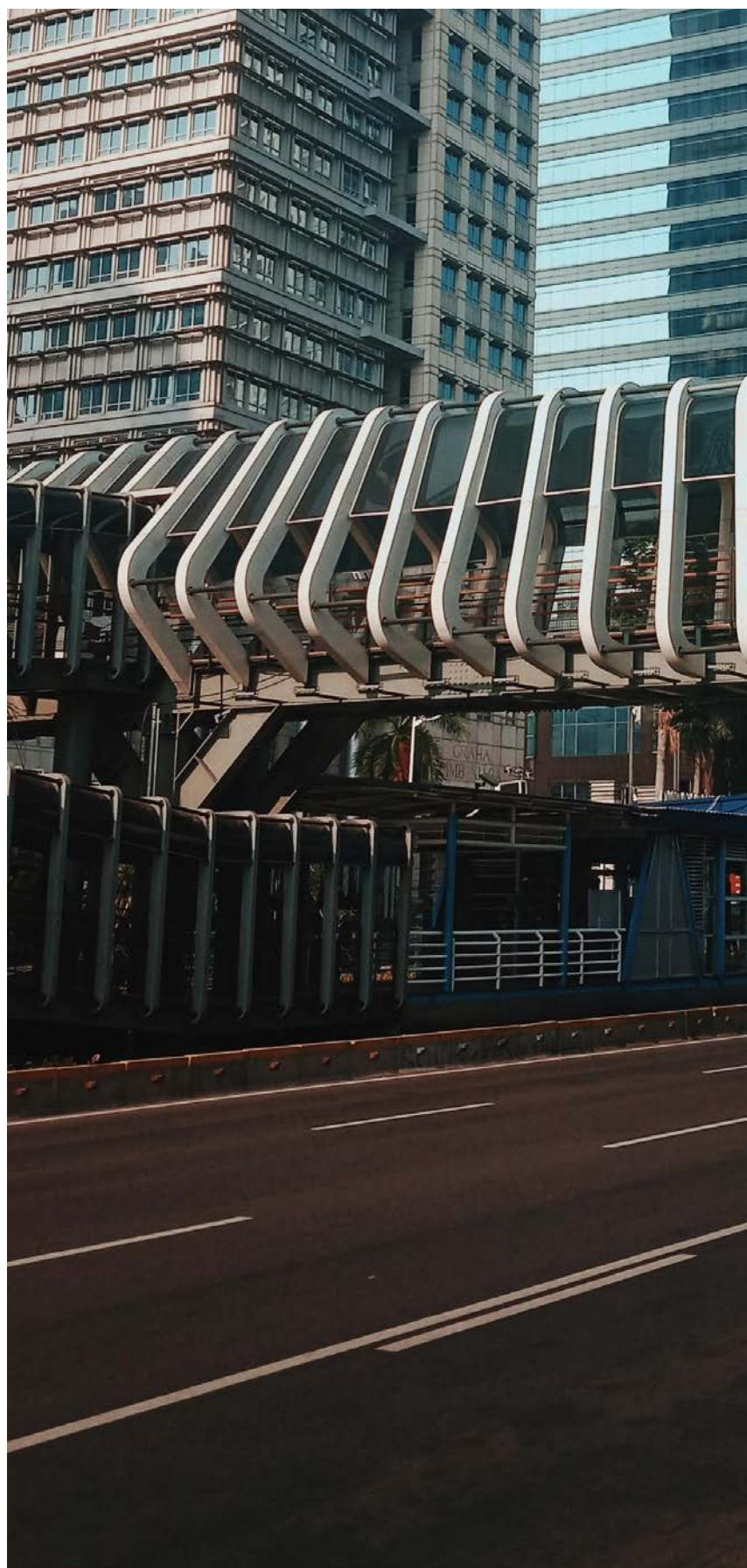
²⁵² In mid-2016, the cut in the DGH's budget led to a cancellation/postponement of a significant number of works and, consequently a substantial budget execution deterioration (90.1 percent)

cyclist). Road space, in terms of lane-km, should be included in annual road statistics and in program preparation. Journey times between super nodes need to be surveyed using a standard methodology every five years.

More efforts are needed to ensure good quality and performance of the national road network. The DGH should revisit the current condition rating and establish new roughness thresholds within the range of the 'stable condition' parameter (e.g., 4-6 m/km IRI). Strengthening project design and supervision, civil works quality control/audits and the compliance with vehicle load capacity restrictions might also help to increase the actual life and performance of roads. The DGH should systematically follow the 2012 pavement design guide for new road construction and apply adequate design tools in the investigation and design of pavement preservation treatments. The quality of engineering designs needs to be enhanced by including an efficient design review mechanism and creating a Major Projects Unit under the MoPWH to be a center of technical expertise for preparation of major projects (>IDR 100 billion) to international standards, using advanced survey and design tools. The DGH's project supervision needs to be improved by shifting to vertical FIDIC-style contract,²⁵³ in which the supervision consultant acts as the employer's representative and is responsible for ensuring compliance by the contractor with all specifications and good practices. The DGH should introduce and ensure compliance with independent technical audits, at least for major asset preservation and road development projects, to enhance the quality of implementation. The current regulation on vehicle load capacity restrictions needs to be properly enforced by police and road traffic controls and related penalties should be increased.

Closer monitoring of expenses is needed to ensure that the higher costs of road treatments and lifecycle costs are justified. The DGH needs to closely monitor the impact of more expensive treatments and concrete pavements on lifecycle costs to justify the higher investment cost. The high costs for delivery of the preservation and development programs should be further examined. Other ways to improve efficiency in these programs should also be identified by the DGH to ensure that optimal value for money is derived from government spending. It is recommended that the MoF increases its active cooperation with the MoPWH in defining and approving road preservation and development unit costs across the country.

²⁵³ FIDIC, the International Federation of Consulting Engineers, defines international standard forms of contracts for the construction industry worldwide. As part of their standard bidding documents the Multilateral Development Banks have for a number of years required their borrowers or aid recipients to adopt the FIDIC conditions of contract. This contract defines that the supervision of the works should be carried out by an engineer who is employed by the employer. The engineer is responsible, among other things, for issuing instructions, certifying payments and determining completion.





B

Develop longer-term strategies to address the backlog in road network capacity

The GoI has already taken steps to address the backlog in road network capacity by extending the network and expanding lane capacity. However, the DGH should refocus the current short-term widening program,²⁵⁴ which comes at a very high cost, on longer-term objectives such as achieving higher geometric standards and safer infrastructure. Moreover, extension of the national road network needs to be balanced between arterial and accessibility objectives. The capacity of congested roads in highly populated Java and Bali needs to be expanded without neglecting accessibility in eastern Indonesia. On widening lane capacity, the DGH should also work closely with local authorities to control road-side activities that impede this objective and to provide pedestrian facilities and drainage in urban areas.

The GoI needs to develop a robust, fully-funded and phased EDP strategy for the long term (about 50 years) to ensure that implementation of the EDP continues to be on track, while spending on national

roads does not fall behind. It is important to recognize that the national road network and expressways are two distinct categories that serve separate purposes. They also have very different requirements for capital and O&M expenditure. Accordingly, it would be advisable to have separate funding and financing plans for these two networks, rather than one big ‘pot’ to finance both national roads and expressways. Such an arrangement would ensure that there is sufficient funding for national roads and for expressways which, in turn, would give the agencies tasked with the implementation of these programs the requisite headroom to plan and execute their strategies with full confidence and greater certainty. It is recommended that the GoI commences a working group consisting of BPJT, the DGH, the DGIF and the MoF to review the funding requirements for the EDP and policy options to bridge the funding gap. The working group could also design a financing strategy, examining optimal financing instruments and developing a funding plan that can help to mobilize the required financing.

²⁵⁴ The DGH has a program for widening narrow national road sections from an average width of 4 - 4.5 meters to a standard of 6 - 7 meters. This program has a short-term vision that exclusively addresses immediate capacity expansion needs.

C

Increase the pool of funding available for national roads & expressways, including by leveraging the private sector

While increasing the efficiency and effectiveness of spending is key, the GoI also needs to increase its funding for national roads and expressways to meet demand growth and GoI targets. With the estimated annual public investment need at IDR 47.5 to IDR 51 trillion, this would require about IDR 2-IDR 6 trillion more of budgetary resources than the central government currently spends. However, when insufficient fiscal resources are available, it is recommended that the GoI prioritizes asset preservation over new investment. In terms of road development, expressways should be prioritized to address the capacity backlog on main corridors.

The GoI needs to identify other potential sources of revenue within the road sector to offset costs and to ensure that the EDP is fiscally sustainable. Such sources could include toll tariff optimization and rationalization, asset recycling, land value capture, concession fees (from projects with excess returns), and collecting tolls from availability payment-based roads. The MoF should explore mechanisms in the medium-term to ensure that the support from such instruments is reliable and credible over the entire period of implementation of the EDP. The MoF, working with the MoPWH, could likewise explore options for hypothecating funds to the EDP coming from various revenue sources. One option for hypothecating

revenues to the EDP is to establish a Revolving Fund.²⁵⁵ As the Revolving Fund starts to operate and fully develops other revenue sources, the EDP will rely less and less on the national budget (APBN) and not encroach on other funding priorities of the MoPWH, particularly road preservation.

Measures should be taken to leverage private sector investment for expressway development. More space for private sector participation should be created by the BPJT in coordination with the DGIF through continuing ongoing efforts to refine the Concession/Guarantee Framework to conform with good industry practice. Moreover, the MoF and the Ministry of SOEs (MSOE) should establish a governance structure to provide incentives for a commercially prudent behavior by SOEs in bidding for and implementing toll-road projects. Once the GoI and BPJT have created a robust and credible enabling environment for private sector participation, there still remains a notable risk of SOEs undercutting private sector bidders, mainly on the strength of any unfair advantage they may continue to enjoy in terms of direct and/or indirect subsidies. If SOEs are not able to act prudently, the GoI may consider excluding them from at least a few projects. Moreover, BPJT should publish an annual monitoring report on the operational performance, asset condition and development status of the expressway network.

²⁵⁵ A Revolving Fund is proposed to be used by the GoI for more effective portfolio delivery planning and financial management of the EDP, by providing predictability and sustainability of funding flows on a multi-year basis. For a more comprehensive discussion, see the World Bank report on “Business Process Reengineering for BPJT” founded by the Indonesia’s Infrastructure Finance Development (IIFD) project.

D

Address institutional challenges to implementing reforms

Constraints to the implementation of the above recommendations are mostly institutional in nature. Specifically, there is a clear need to revisit the structure of the DGH to ensure that it is set up to target greater efficiency and effectiveness of spending on national roads and expressways. Consolidating the *Balai* structure—i.e., recentralizing scattered technical skills through the creation of a Major Central Projects Unit—may support more efficient programming, selection and sizing of projects, and better focus the responsibility for asset management. The DGH’s staff should progressively change their focus from project implementation to program management and delivery of network performance, while assigning responsibility for project supervision to the private sector. This would imply a progressive reduction of staff in implementation activities at the *Balai* level and a greater use of management systems to improve the efficiency and effectiveness of programs. In addition, the DGH should collect information on the job rotation and development of expert skills and core competencies on a regular basis for further research. It could also strengthen the application of merit-based factors in staff employment and promotion processes by using the *Sasaran Kerja Pegawai* (SKP) performance indicators more effectively.



Annex 9.1

1

Calculation of the backlog

The national road capacity backlog is calculated based on the traffic flow condition observed along the national roads as follows:

Traffic flow condition	Road space (lane-km)
Congested	2,935
Very congested	6,341
Highly congested	1,564
Total	17,117

Source: DGH 2017 and World Bank staff analysis.

2

Estimated annual investment needs for national road development and preservation are calculated as follows:

A

IDR 19-IDR 20 trillion for road development. This would mostly finance the renewal of arterial roads (IDR 13.2 trillion), with the remainder for other projects such as bridges, strategic road development, and improvement of accessibility standards.

B

IDR 16.5-IDR 19 trillion for road preservation, including:

1. IDR 2.4 trillion per year for routine maintenance of the whole network. This is the average road routine maintenance cost of IDR 49.3 million/km multiplied by 47,017km = IDR 2.4 trillion/year.

2. IDR 4.7-IDR 7.2 trillion per year for road rehabilitation of 5 percent of the network. The average road rehabilitation cost is IDR 2-3 billion/km. So, IDR 2-IDR 3 million/km x 5 percent x 47,017 km = IDR 4.7-IDR 7.2 trillion/year;

3. IDR 9.4 trillion/year for road reconstruction of 5 percent of the network. The average road reconstruction cost is IDR 4,009 million/km based on the data from DGH 2011-15. So, IDR 4,009 million/km x 5 percent x 47,017 km = IDR 9.4 trillion/year.

C

IDR 32 trillion for the EDP (IDR 474 billion over 15 years), including IDR 20 trillion from the private sector and SOEs.