



University of HUDDERSFIELD

University of Huddersfield Repository

Hayat, Ezri and Amaratunga, Dilanthi

Post-Disaster Road Reconstruction in Aceh - Local Governments' Role in Road Maintenance

Original Citation

Hayat, Ezri and Amaratunga, Dilanthi (2012) Post-Disaster Road Reconstruction in Aceh - Local Governments' Role in Road Maintenance. In: 2012 Annual International Conference of the International Institute for Infrastructure, Renewal and Reconstruction IIIR, 24th-26th August 2012, Kumamoto, Japan.

This version is available at <http://eprints.hud.ac.uk/25338/>

The University Repository is a digital collection of the research output of the University, available on Open Access. Copyright and Moral Rights for the items on this site are retained by the individual author and/or other copyright owners. Users may access full items free of charge; copies of full text items generally can be reproduced, displayed or performed and given to third parties in any format or medium for personal research or study, educational or not-for-profit purposes without prior permission or charge, provided:

- The authors, title and full bibliographic details is credited in any copy;
- A hyperlink and/or URL is included for the original metadata page; and
- The content is not changed in any way.

For more information, including our policy and submission procedure, please contact the Repository Team at: E.mailbox@hud.ac.uk.

<http://eprints.hud.ac.uk/>

Post-Disaster Road Reconstruction in Aceh - Local Governments' Role in Road Maintenance

Ezri HAYAT¹ and Dilanthi AMARATUNGA²

¹University of Salford, Manchester, UK,

Email: e.hayat@edu.salford.ac.uk

²University of Salford, Manchester, UK,

Email: R.D.G.Amaratunga@salford.ac.uk

Many studies have shown the importance of improved road infrastructure towards economic development of a region through economic agglomeration and widened business network coverage resulting from better access and higher mobility. However, such benefit can only be achieved if road infrastructure remains accessible and reliable in the long term period. Accordingly, in addition to resources required for the construction, road management will also need to allocate adequate resources for the maintenance.

In the event of major natural disasters, road infrastructure is among the sectors that often suffer from the greatest damages and losses. It is also suggested that reconstruction of road infrastructure is critical for a speedy recovery process. In the case of tsunami reconstruction in Aceh, Indonesia, poor road infrastructure is also argued to have caused delays and higher reconstruction cost.

In most developing countries such as Indonesia, another important issue requiring particular attention is the ability and capability of local government in maintaining road infrastructures. In the post-tsunami reconstruction in Aceh, disregard to road classification and ownership status (national, Prov. or district), most of road reconstruction projects were either funded or co-funded by national government and donor agencies; which project outcomes were then transferred to local government. This resulted in giving additional burden to local governments with low technical and financial capacity for maintaining and ensuring the long term benefit of the investment, particularly where there are more road networks reconstructed than destroyed.

Accordingly, this paper, which is based on an ongoing PhD study, discusses issues identified in the post-disaster road reconstruction in Aceh with regards to local governments' capacity in road maintenance. The discussion includes regulations, policies and other aspects that contributed to the road management and maintenance within the context of Aceh post-tsunami reconstruction.

Key Words: *disaster management, road reconstruction, local government, maintenance, Aceh*

1 INTRODUCTION

A number of studies highlight the impact of improvement in road transport infrastructure towards economic condition of a region. Cheesman¹ suggests that better access and reduced transport time resulted from improved road network have helped farmers in Malawi reduce their post-harvest crop loss. Similarly, Bryan et.al² argue that the construction of the A55 road network in North Wales, UK, has resulted in better access to local suppliers and increased operational cost savings and created more than 4,200 job opportunities during its construction. Generally, improved road infrastructure may lead to increased market agglomeration, productivity and labour supply³ as well as increased international competitiveness, better trade, communication and socio-economic development growth⁴. Compared to other means of transport speed, flexibility and accessibility of road transport in reaching virtually all points⁵ and in connecting other transport system⁴ seem to be the distinct features of road transportation.

In Indonesia, with more than 237 million people⁶ road transportation predominates the movements of goods and people. Annually, around 99% of the 3.8 billion passenger travels and 97% of the 2.4 billion tonnes of goods movements is delivered by means of land transport. Particularly in Java and Sumatra Island,

road transport predominates as high as 80-90% of the total movements⁷⁾. In addition to the high percentage of road transport use, the growth rate of road vehicles is also high. Between 2004 and 2009, the number of vehicles grew from 23 million vehicles in 2004 to more than 52 million vehicles by 2009; a growth rate of more than 220%⁸⁾. Such high level of vehicle growth indicates the increasing needs and dependencies towards road infrastructures.

Table 1 Vehicle Growth in Indonesia

Year	Car	Bus	Truck	Motorcycle
2004	4,464,281	933,199	2,315,779	23,055,834
2005	5,494,034	1,184,918	2,920,828	28,556,498
2006	6,615,104	1,511,129	3,541,800	33,413,222
2007	8,864,961	2,103,423	4,845,937	41,955,128
2008	9,859,926	2,583,170	5,146,674	47,683,681
2009	10,364,125	2,729,572	5,187,740	52,433,132
Grand Total	49,547,659	11,843,490	26,005,780	247,073,871

Source: BPS⁸⁾

Whilst the need for good and reliable road infrastructure is high, the road infrastructure condition is not satisfactory. By 2006 less than 32% of the 34628,8 km national road network are in good condition, whilst the remaining of the networks are either in moderate condition (50%), lightly damaged (9.3%) or severely damaged (9.1%)⁹⁾. The national road condition improved substantially in 2008 when the government launched a series of projects to increase road capacity through road expansion of road lanes. By 2009, these project resulted in the increased of lanes from 59,107 lanes in 2004 to 84,985 lanes in 2009⁹⁾.

Table 2 Condition of National Road in Indonesia 2006-2008

No	Condition	2006		2007		2008	
		km	%	km	%	km	%
1	Good	10956.6	31.6%	11905.4	34.4%	17200.9	49.7%
2	Moderate	17314.3	50.0%	16565.7	47.8%	11620.1	33.6%
3	Lightly Damaged	3210.1	9.3%	3232.7	9.3%	4617.9	13.3%
4	Heavily Damaged	3147.8	9.1%	2925.0	8.4%	1189.9	3.4%
	Total	34628.8	100%	34628.8	100%	34628.8	100%

Source: adopted from Binamarga⁹⁾

Having described the general condition of road infrastructure in Indonesia, accordingly, the following paragraphs will discuss the role of road infrastructure and its importance in the post-disaster context.

2 ROAD INFRASTRUCTURE IN POST-DISASTER CONTEXT

Indonesia is a tropical country located in the equatorial line. Approximately 19% of its total area (1.9 million km²) is spread in thousands of islands surrounded by a number of active volcanoes and tectonic plates. Hence, Indonesia is highly prone to various natural disasters including earthquakes, floods, landslides, fires and droughts. One of the worst natural disasters in Indonesia was the 2004 earthquake and tsunami in Aceh which cost more than 126 thousands lives and Rp 41 trillion (~US\$ 4.1 billion) of losses and damages¹⁰⁾.

In the post-disaster emergency and reconstruction period, road infrastructure plays a crucial role. A study of Grünewald¹¹⁾ suggests that transport disruption into and out of the disaster affected area was considered a vital constraint to provision of efficient response in the emergency and post-disaster reconstruction activity in Haiti. Similarly, in the reconstruction of Aceh post-tsunami, collapsed road sections and bridges enforced distribution of aid to isolated areas by the means of air and water transports. This resulted in both lengthy delivery and high operational cost, as also experienced in Mentawai¹²⁾. In the reconstruction period, poor road infrastructure is also accused as one of the factors that caused an increase in material transportation cost and construction lead time. Consequently, this led to high material prices and construction delays in Aceh¹³⁾.

(1) Opportunities in disaster

In the event of major natural disaster, road infrastructure is among the sectors which suffer the most losses and damages. In regard to the tsunami in Aceh, the infrastructure sector suffered nearly 20% (Rp 8.1 trillion) of the total damages and losses. Of that amount, road networks accounted for more than Rp 1.7 trillion¹⁴⁾ and more than 2,600 km of road networks were destroyed¹⁵⁾.

Table 3 Damage and Loss Aceh and Nias Earthquake 2005 (billion of Rp*)

Sectors	Damage	Loss	Total
Social sector, including: housing, education, health, religion and culture	13,657	532	16,186
Infrastructure Sector , including: transportation, communication, energy, water and sanitation, dam	5,915	2,239	8,154
Production Sector, including: agribusiness, fishery, industry and trade	3,273	7,721	8,154
Cross-Sector, including: environment, Government Administration, banking and Finance	2,346	3,718	6,064
Total (billion of Rp)	27,191	14,210	41,401

Sources: Bappenas¹⁰⁾; *) 1US\$ ~ Rp 10,000

However, despite damages and losses that disasters may cause to development, disasters may also provide development opportunities. On the one hand, disasters may cause great suffering to people and cause significant setback in the development of a country through destruction of decades of social and economic investment and redirection of funds which could have been used for development into reconstruction¹⁶⁾. On the other hand, disasters also offer opportunities for physical, social, political and environmental development that may not be available previously¹⁷⁾. These development opportunities may appear in form of community raised awareness on Disaster Risk Reduction (DRR) components, upgraded health facilities, improved and better enforced building codes as well as construction of new and improvement of road infrastructure. The extent to which disaster may be used as development opportunity also depends on the availability of fund for the reconstruction.

The availability of fund for the post-disaster road reconstruction can occur in 3 different scenarios. Each of these 3 different scenarios also has different targeted outcomes¹⁸⁾. The first scenario is when fund is not enough to restore the affected region to its pre-disaster condition. In this case, priorities are given to reconstruction of housing and rehabilitation of public service at the minimum level and provision of aid to stimulate the economic recovery. In the second scenario, the fund is just enough to restore the affected region to its pre-disaster condition. The rehabilitation and reconstruction is expected to exceed the minimum level of public service standard and covering all of the affected sectors and areas. The third scenario is when the availability of fund exceeds the required amount to restore the affected region to its original condition. Here, the rehabilitation and reconstruction activities are expected to cover wider areas beyond the affected sectors and areas.

In the reconstruction of Aceh, the third scenario was in place. The number of pledges made to Aceh and Nias exceeded the minimum fund required to restore the regions to their pre-disaster condition by as much as US\$1.3 billion¹⁹⁾. Therefore, a 'build back better' scenario in the rehabilitation and reconstruction of the affected region beyond its original condition was possible to implement. In regards to road infrastructure, the scope of road reconstruction in Aceh was extended from reconstructing only disaster-affected area to

including the non-affected areas. During the reconstruction period, as long as 3,696 km of roads were (re)constructed by 2009 while the affected road networks were only 2,618 km¹⁵⁾. The difference in total length means that more than 1000 km of "unaffected" road networks were either constructed or improved under the reconstruction scheme. Many of these projects are funded or co-funded by either the national government through the special agency established for the tsunami reconstruction; *Agency for the Rehabilitation and Reconstruction of Aceh and Nias (BRR)* or by donor agencies. Even though most of the road networks in Aceh province have been improved after the tsunami, there are concerns over the sustainability of the reconstructed road networks in terms of the capacity of the local government in providing adequate maintenance.

3 IMPORTANCE OF ROAD MAINTENANCE

On the one hand, the possibility of reconstructing road beyond its pre-disaster level means that there will be fewer isolated areas in the affected region. In turn, it is also expected to be a stimulant for the improvement of the local socio-economic condition. On the other hand, it may also provide extra and long-term financial and technical burdens for the local government and road management agencies. A significant amount of additional resources will be required to maintain and ensure the sustainability of the reconstructed roads throughout their designed life-cycle. If the road authorities fail to adequately maintain the reconstructed infrastructure then the maintenance needs may be deferred and result in increased maintenance backlog; which resembles the over-investment in road infrastructure experienced by many African countries²⁰⁾.

For a road network to be sustainable over its designed life-cycle period, adequate maintenance must be allocated and resourced based on its life-cycle cost²¹⁾. Neglected, poor road maintenance can lead to a number of consequences. From financial aspect, poorly maintained road infrastructure deteriorates faster and the required remedy costs more than what it actually needs for maintenance. A study of Harral and Faiz²²⁾ on road maintenance in 85 countries concludes that as much as \$45 billion worth of investment in road infrastructure could have been saved by provision of less than \$12 billion of preventive maintenance. Another study confirms that rehabilitation of paved road after 15 years of lack of maintenance may cost as much as \$200,000 per km which could have been avoided by provision of \$60,000 per km of regular maintenance²³⁾. Poorly maintained road infrastructure may also increase road user costs. This cost particularly incurs due to blocked access during rainy season, reduced travel speed and shortened vehicle parts life caused by potholes. It is argued that each dollar 'saved' on road maintenance results in an increase to vehicle operating cost by \$2 to \$3²³⁾.

As previously described, Indonesia has been struggling to provide adequate maintenance of its road networks. Each year, the government of Indonesia can only allocate around 60% of the Rp 27 trillion (US\$ 2.7 billion) required for the construction and maintenance of national road alone²⁴⁾. The regional road networks are considerably poor and deteriorate gradually where less than 25% are in good condition and more than 50% are damaged (see Table 4). Consequently, the poor road condition is predicted to cost road users as much as US\$105 million per day and accused as one of the causes of low investment growth in Indonesia⁷⁾.

Table 4 Condition of District and Municipal Road in Indonesia⁹⁾

No	Condition	2006		2007		2008	
		km	%	km	%	km	%
1	Good	69,050.81	24.35%	68,727.67	24.26%	69,948.76	24.27%
2	Moderate	69,921.13	24.65%	71,106.71	25.10%	72,330.51	25.10%
3	Lightly Damaged	96,019.32	33.86%	90,799.69	32.05%	88,462.15	30.70%
4	Heavily Damaged	48,620.38	17.14%	52,687.89	18.60%	57,443.96	19.93%
	Total	283,611.64	100%	283,321.96	100%	288,185.38	100%

Source: Binamarga Strategic Plan 2010-2014⁹⁾

Accordingly, in addition to provision of adequate fund for the development of road infrastructure, adequate financial resource allocation is also required for the maintenance activities. The allocation may need to consider the overall life-cycle period in order to ensure the sustainability and to achieve the maximum benefit of the investment.

(1) Issues associated with road maintenance

A number of literatures have identified common issues related to road maintenance. These include fund competition, division of responsibilities between central and regional government, politicized priorities, lack of customer focus, perverse monetary incentives, inefficient work method and inflexible term and conditions of civil service²⁰⁾. Whilst the aforementioned problems are common to most countries, developing countries face additional problems such as low income per head, acute shortage of revenues, weak governance, lack of qualified local consultant and contractors and weak legislation²⁰⁾

In addition to the aforementioned factors, poor allocation of fund for road maintenance is also influenced by political, cultural and social issues²⁵⁾. In developing countries, decisions are often made based on consensus instead of economic rationale and therefore road is often seen as public service, not a business²⁵⁾. As a result, many governments in developing countries fail to see the importance and economic benefits of preventive road maintenance. Many governments opt to pursue the more expensive curative approach which is to rehabilitate road networks when it is already broken. For instance, it may be considered more important and politically 'attractive' to pave new road and reduce isolation of one village instead of spending money for maintaining the existing road of the neighbouring villages²⁵⁾. This also appears to be the case in Indonesia. Even though on the one hand there are indications of increased needs and dependencies towards road infrastructure, the existing road networks are suffering from poor maintenance and deteriorate rapidly.

The above paragraphs have briefly described the general issue of road maintenance in the national context of Indonesia. Respectively, the following paragraphs discuss the road maintenance issues in Aceh province.

4 ROAD MAINTENANCE ISSUES IN ACEH PROVINCE, INDONESIA

Due to the decentralisation of governance system in Indonesia (Law no 22/2009), a significant amount of authorities and responsibilities are transferred from central government to regional governments (i.e., Provincial and local governments). In this context, it includes allocation of fund for development and maintenance of road infrastructure. Consequently, the regional governments in Aceh are held responsible for the development and maintenance of more than 90% of the road networks which is more than 18,000 km in total. Unfortunately, by 2004, only 17.8% of the road network in Aceh was in good condition, around 60% was in fair condition and more than 22% was in poor condition (see **Table 5**).

Table 5 Road Network in Aceh, 2004

Types of road	Good Condition		Fair Condition		Poor Condition		Total Length	
	km	%	km	%	km	%	km	%
National	127	7.4	1,052	61.3	538	31.3	1,716.27	9.21
Prov.	199	12.6	646	41.1	727	46.2	1,571.66	8.44
Districts	2,995	19.5	9,410	61.3	2,995	19.5	15,339.37	82.35
Total	3,320	17.8	11,108	59.4	4,259	22.8	18,627.3	100

Source: Bappeda, cited in World Bank ²⁶⁾

(1) Low O&M budget and Gradual decrease for O&M of public service

Despite the poor road condition, the annual fund allocation for road maintenance in Aceh is significantly inadequate. The decentralization system and Aceh's special autonomy status have led to a significant increase in the annual budget expenditures. This is mainly due to transferred financial responsibilities from central government and additional income from oil and gas revenue sharing. However, in contrast, the allocation for 'operational and maintenance' of public services has been gradually decreased²⁶⁾.

Table 6 Composition of Aceh Public Expenditure 2003 – 2005

Expenditures	2003		2004		2005	
	Prov.	Districts	Prov.	Districts	Prov.	Districts
Apparatus Expense	34.7%	34.9%	37.2%	38.5%	40.9%	39.8%
Capital	5.4%	4.1%	4.9%	4.3%	7.1%	4.8%
General Administration	22.7%	26.1%	23.4%	28.2%	24.2%	31.1%
O&M	6.5%	4.6%	8.9%	6.1%	9.5%	4.0%
Public Expense	65.0%	55.6%	62.6%	51.8%	58.2%	50.9%
Capital	28.9%	16.6%	28.1%	15.2%	24.5%	18.6%
General Administration	2.1%	22.5%	1.3%	22.5%	0.9%	18.2%
O&M	34.1%	16.5%	33.2%	14.1%	32.9%	14.1%
Unexpected Expenses	0.3%	2.3%	0.2%	2.1%	0.9%	1.6%
Financial Ass. & Sharing Exp.	0.0%	7.3%	0.0%	7.6%	0.0%	7.7%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Source: Adopted from World Bank ²⁶⁾

The proportion of fund allocation for Operational and Maintenance (O&M) of public expenses between 2003 and 2005 was higher at the Provincial level (at about 33-34%). For the same period, district governments averagely allocated less than half of the Provincial O&M allocation at only 14-16% of its total annual budget. However, since more than 82% of the road networks in Aceh are district roads, hence under the responsibility of district governments, this poses significantly higher threat to the overall condition of road infrastructure in Aceh.

In order to improve the road condition and help ensure the sustainability of road infrastructure, Indonesian government has initiated the establishment of road fund agency as stipulated in Law no 22/2009. However, the road fund agency has not been functioning and its supporting mechanism and regulations have not been clearly defined. Until the road fund agency starts functioning, it seems that road maintenance will continue relying on fund from the general expenditure and normal budgetary system.

Furthermore, in Aceh tsunami reconstruction, road infrastructure projects are mostly funded by national government and donor agencies. Due to this opportunity, many district governments further reduced their infrastructure investment in the hope that national government and donor agencies would cover the needs²⁶⁾. In most post-disaster reconstruction projects, Donor agencies rarely provide donations of capital fund for infrastructure projects along with the additional resources required for the maintenance over a particular service period. Normally, the maintenance requirement is expected to be borne by the beneficiary governments. Therefore, despite being affected by disasters and receiving reconstruction assistance, regional governments remain responsible for the long term maintenance of the ‘donated’ road infrastructure.

Among others, the poor allocation of fund for road maintenance is argued to be caused by the poor capacity of the local governments in financial management. A study on Public Financial Management capacity of Aceh province governments was conducted by World Bank in 2007²⁷⁾. The result of the study will be discussed briefly in the next paragraphs.

(2) Poor Public financial management capacity

The fund for road maintenance needs in Aceh is currently sourced from the general budget expenditure which allocation follows the normal budgetary system. Therefore, road maintenance in Aceh province is highly dependent to the allocation of fund as budgeted in the annual expenditures. As mentioned earlier, allocation of fund for road maintenance will need to compete with other sectors and decisions are often made subjectively due to political pressure. Hence, the public financial management capacity of local governments in producing annual budget as well as their capacity to effectively and efficiently spend the actual allocation is an essential factor.

Unfortunately, the capacity of the regional governments in public financial management (PFM) is considerably low. According to the report of *Public Financial Management in Aceh*²⁷⁾, the low PFM capacity is due to the rapid decentralization process which transfer fiscal responsibilities and financial resources to local governments that was not followed by increased capacity of local government to manage these resources. This condition is worsened by the significant rise in the number of new districts (from 10 districts in 2000 to 21 districts by 2011) as well as by the prolonged conflict and tsunami.

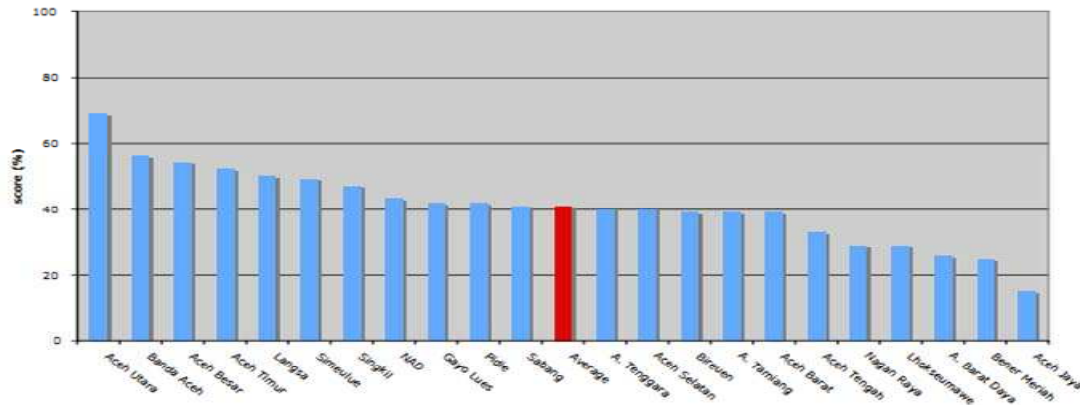


Fig.1 PFM Scores of 21 districts in Aceh
Source: World Bank²⁷⁾

Furthermore, as presented in Fig.1, the score of most of the districts in the west coast area (Aceh Selatan, Aceh Barat, Nagan Raya, Aceh Barat Daya and Aceh Jaya) are below the average district score. Since tsunami hit most of the west coast areas, the majority of road infrastructures in these districts have accordingly been reconstructed relatively rapidly during the post-disaster reconstruction period. As a result, concerns over the maintenance of the reconstructed road infrastructures in these areas are accordingly higher.

(3) Delays in budget approval

Another concern related to the PFM capacity and its effect on road maintenance is regarding delays of the annual budget approval. The financial year in Indonesia starts on January 1st and ends on December 31st. According to Regulation of Ministry of Internal Affairs no 59/2007, the budgeting process starts on the first week of June when the regional secretary submits the draft of general expenditure policies and budget priorities (called KUA) to the governor. The governor then further finalize these draft documents with the parliament and the resulting outcome is used as the bases for the preparation of works and budget plan (called RKA) by each of regional departments and bodies. The collection of each RKA altogether forms the draft of annual budget proposal (called APBA) that need to be submitted by Governor to the parliament for approval at the latest by the first week of October. The parliament, accordingly, need to approve the budget proposal at the latest 1 month prior to the start of the financial year, i.e., 1st of December. However, approvals of the annual budget proposal have always been delayed.

Table 7 Delays in Budget of Approval of Aceh Province

Financial Year	Date of Budget Approval
2006	March 5th 2006
2007	May 20th 2007
2008	June 24th 2008
2009	January 29th 2009
2010	March 19th 2010
2011	April 15th 2011
2012	February 10th 2012

Among other provinces in Indonesia, in the last 5 years, Aceh province appears to be the latest province that approves its budget plan which can be as late as June of the running financial year. Such delays occur due to both late submission of budget proposal by the governor and late approval by the local parliament. Because of the delays the national government issue a penalty of 25% cut of Aceh's general allocation fund (DAU) which could worth as much as Rp 130 billion (US\$ 13 million). Additionally, delays in budget approval would also mean that the remaining time to spend the allocated budget is automatically reduced, and if the government could not use the entire allocated budget, the allocation for next budget proposal may be reduced to reflect the actual fund absorption capacity.

5 CONCLUSION

To conclude, road infrastructure is an important element for the development of a region. However, not only is fund required for the construction and development of new road infrastructures, adequate resource allocation for the maintenance is also essential to ensure the maximum benefit of the investment

In Indonesia, more than 80% of passenger and goods movements are done by means of road transport. This high proportion of road transport uses as well as the rapid growth rate of vehicles number indicates the increasing needs and dependency towards reliable road infrastructures. However, the majority of road infrastructures in Indonesia are in poor condition with less than 50% of Indonesia's national road is in good condition. The poor condition is accused to be caused by low investment and inadequate maintenance.

In the event of post-tsunami reconstruction in Aceh, losses and damages in road infrastructure sector appears to be the worst after housing. However, since the number of pledges made to Aceh that exceeds the required amount to restore Aceh to its original condition, a significant amount of investment was made to improve various sectors, particularly road infrastructure. The scope of road reconstruction was also extended from reconstructing only the affected areas to also including the non-affected areas. By 2009, the road reconstruction activities had accordingly (re)constructed more than 3,500 km of road networks.

Even though a large number of road networks in Aceh have been reconstructed hence provide opportunity for economic development and remove isolations of many particular areas, there is a concern over the long term maintenance of the reconstructed road.

Similar to Indonesia, Aceh province has an even poor record in providing maintenance for the road infrastructure. Most of the annual budget expenditure is allocated for routine apparatus expenses and personnel salaries with only 14-16% of the total budget is allocated for the operational and maintenance of all public facilities. Poor allocation of fund for maintenance and poor capacity in public financial management is also argued to be one of the causes which is attributable to three reasons; rapid decentralization that is not followed by capacity building, significant rise in the number of new districts as well as the prolonged conflict and tsunami. Subsequently, in addition to the inadequate allocation, the late approval of annual budget proposals has also worsened this condition by shortening the budget implementation period, penalty from national government and reduction of the following year budget due to poor absorption.

Therefore, the long term benefit of the investment made in road infrastructure is challenged. Currently, most of the road projects are just finished and some projects are yet to be finalized. Therefore, the reconstructed road is relatively new and the actual degradation may not be apparent. However, the aforementioned issues highlight the importance of road maintenance as well as concerns in regard to the roles of local governments in road maintenance. It is argued that unless such concerns are addressed and adequate resources for maintenance are therefore allocated, a significant amount of investments made in the post-disaster road reconstruction will soon deteriorate and rapidly lose its intended value.

REFERENCES

- 1) Cheesman, L.P., *Rural Transport – Theory into Practice*. International Journal of Physical Distribution & Logistics Management, 1993. **20**(5): p. 13-19.
- 2) Bryan, J., et al., Road infrastructure and economic development in the periphery: the case of A55 improvements in North Wales. *Journal of Transport Geography*, 1997. **5**(4): p. 227-237.
- 3) Crafts, N., Transport Infrastructure Investment: Implications for Growth and Productivity. *Oxford Review of Economic Policy*, 2009. **25**(3): p. 327-343.
- 4) Anapolsky, S., *Challenges of Road Infrastructure In Montenegro*. Montenegro Economic Trends, 2002: p. 60-65.

- 5) Beilock, R., K. Stanchev, and Z. Blagoeva Hidden barriers to development in the Balkans: International road transportation Phase I. 2002.
- 6) BPS, Penduduk Indonesia menurut Provinsi 1971, 1980, 1990, 1995, 2000 dan 2010, 2010, Badan Pusat Statistik.
- 7) Dephub, *Masterplan Transportasi Darat*, 2005, Ditjen Perhubungan Darat, Departemen Perhubungan
- 8) BPS. *Perkembangan Jumlah Kendaraan Bermotor Menurut Jenis tahun 1987-2009*. 2010 [cited 2011 30 December]; Available from: http://www.bps.go.id/tab_sub/view.php?tabel=1&daftar=1&id_subyek=17¬ab=12.
- 9) Binamarga, *RENCANA STRATEGIS 2010-2014 DIREKTORAT JENDERAL BINA MARGA*, M.o.P.W. Directorate General Bina Marga, Editor 2010.
- 10) Bappenas, Master plan for the rehabilitation and reconstruction of the regions and communities of the province of Nanggroe Aceh Darussalam and the islands of Nias, province of North Sumatera, BAPPENAS, Editor 2005.
- 11) Grünewald, F., A. Binder, and Y. Georges, *Inter Agency Real Time Evaluation in Haiti*, 2010, Global Public Policy Institute.
- 12) Dharmastuti, H., Ombak Besar Hadang Distribusi Bantuan Logistik di Mentawai, in *detiknews.com*2010: Jakarta.
- 13) Chang, Y., et al., Donor-driven resource procurement for post-disaster reconstruction: Constraints and actions. *Habitat International*, 2011. **35**(2): p. 199-205.
- 14) Nugroho, A., MEMORI AKHIR TUGAS DIREKTORAT JALAN DAN JEMBATAN, 2008, BRR.
- 15) Sihombing, B.S., *INFRASTRUCTURE: Stimulating the Triggerring Sector*. BRR Book Series, ed. C. Suhartono, M. Agusta, and R. Hidayat. Vol. 8. 2009.
- 16) UNDP, A Global Report: Reducing Disaster Risk - A Challenge for Development, 2004, UNDP.
- 17) Asgary, A., et al. Lost And Used Post-Disaster Development Opportunities In Bam Earthquake And The Role Of Stakeholders. in *International Conference and Student Competition on Post-Disaster Reconstruction : Meeting stakeholder interests*. 2008. Florence, Italy.
- 18) Pranoto, S., *Pembelajaran Rehab Rekon Pasca Gempa di Sumatra Barat*2011: Tim Pendukung Teknis Rehabilitasi dan Rekonstruksi, Badan Nasional Penanggulangan Bencana.
- 19) Subekti, A., *FINANCE: The Seven Keys to Effective Aid Management*. BRR Book Series, ed. C. Suhartono, H. Supit, and M. Agusta. Vol. 2. 2009.
- 20) Heggie, I.G., Commercializing management and financing of roads in developing and transition countries. *Transport Reviews*, 2003. **23**(2): p. 139-160.
- 21) Robinson, R., U. Danielson, and M. Snaith, *Road maintenance management: concepts and systems*1998: Macmillan.
- 22) Harral, C. and A. Faiz, *Road Deterioration in Developing Countries - Causes and Remedies*, 1988, World Bank,.
- 23) Heggie, I.G., *Management and financing of roads*1995: The World Bank.
- 24) ANTARAMATARAM.COM. *DANA PRESERVASI JALAN BELUM BISA DIMANFAATKAN*. 2010 [cited 2011 10th July]; Available from: <http://www.antaramataram.com/berita/?rubrik=5&id=8097>.
- 25) ADB, *Road Funds and Road Maintenance: An Asian Perspective*, 2003, ADB: Manila.
- 26) World Bank, *Aceh Public Expenditure Analysis - Spending For Reconstruction And Poverty Reduction*, 2006, The World Bank.
- 27) World Bank, *Public Financial Management in Aceh - Measuring Financial Management Performance in Aceh's Local Governments*, 2007.