Government of Nepal

Ministry of Physical Infrastructure and Transport

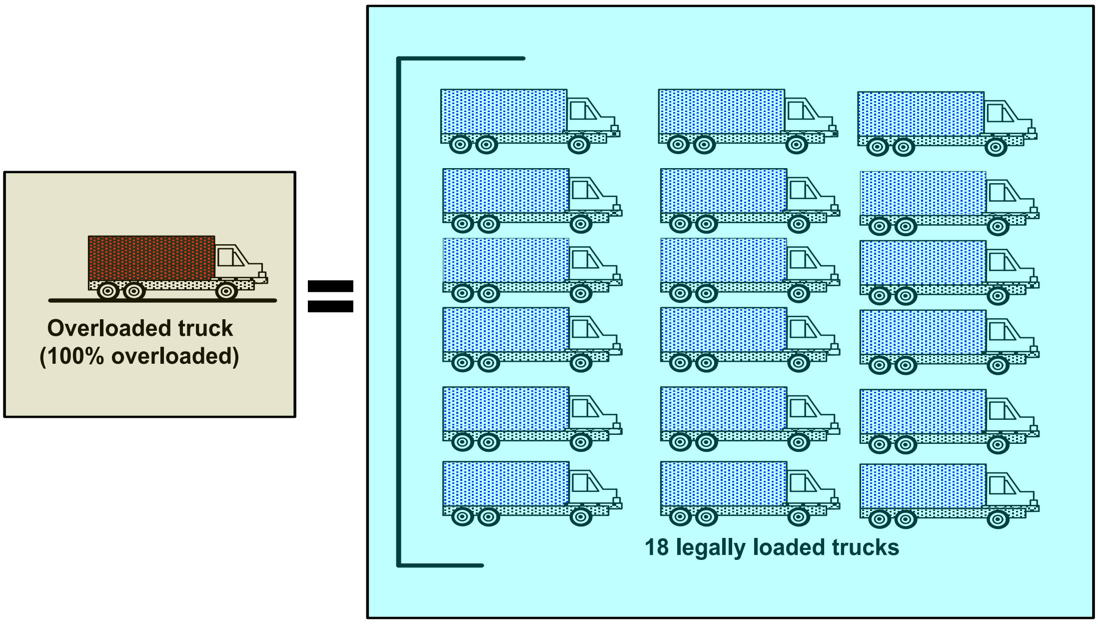
Department of Transport Management

NEPAL INDIA REGIONAL TRADE AND TRANSPORT PROJECT (NIRTTP)

SUB-PROJECT OFFICE

Road Transport Safety and Axle Load Control Study in Nepal

Part B: Axle Load Control



TASK-B4

REVIEW AND ASSESSMENT OF VEHICLE OVERLOADING FINES AND PAYMENT MODALITIES

Submitted by:

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in association with

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May 2015

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ACRYMNS AND DISAMBIGUATION

AADT	Average Annual Daily Traffic
AASHTO	American Association of State Highway and Transportation Officials
ALC-MIS	Axle Load Control Management Information System
DoR	Department of Roads
DoTM	Department of Transport Management
DRO	Division Road Office
ESA	Equivalent Standard Axle
ESAL	Equivalent Standard Axle Load
GVM	Gross Vehicle Mass
GVW	Gross Vehicle Weight
GCW	Gross Vehicle Weight
HDM-4	Highway Development and Management -4
IARMP	Integrated Annual Road Maintenance Plan
JICA	Japan International Cooperation Agency
Km	Kilometer
MVTMA	Motor Vehicle and Transport Management Act - 1993
MVTMR	Motor Vehicle and Transport Management Regulation - 1997
NIRTTP	Nepal India Regional Trade and Transport Project (WB/GoN)
Rs	Rupees
TP	Traffic Police
UGX	Ugandan Shilling
US$	United State Dollars
Veh	Vehicle
RWF	Rwandan Franc
WCC	Weighbridge Clearance Certificate
Wtd	Weight

EXECUTIVE SUMMARY

The vehicle overloading is one of the major contributors for early deterioration of the pavement condition and bridge fatigue damage. Vehicle overloading results the intense stress on the pavement and it eventually damage the pavement structure. A damaging effect to the road pavement due to the vehicle that carries twice the permissible load brings about the damage to the road pavement that 16 repetitions of the normally loaded vehicle axle would have imposed. Therefore, it can be easily conclude that vehicle overloading deteriorate the pavement rapidly thereby requiring a huge maintenance cost. Different kinds of fine schedule have been adopted in overseas. In order to discourage the vehicle overloading on the road, overloading charges are collected in Nepal at the ad hoc basis if vehicle is found overloaded during weighing. The fine schedule is set in the range from NRs 500 to NRs 2,000 without any scientific study. Therefore, this study is aimed at estimating the overloading fines from the view point of increase in maintenance cost.

The different policies adopted in setting vehicle overloading fines are; (i) towards self-regulation in vehicle overloading; (ii) decriminalization of vehicle overloading; (iii) charging to recover road damage cost; (iv) distance based charging and (v) compounded charging for multiple offences.

The Study Team estimated the road maintenance cost for “With and Without” overloading cases. In order to estimate the road maintenance cost, traffic volume data and vehicle overloading data were taken from the axle load survey conducted by the Study Team in Naubishe/Dhading on March 10, 2015. Annual Average Daily Traffics (AADT) and Gross Vehicle Weights (GVW) were calculated based on results of the survey. Based on traffic compositions and GVW of two axle vehicle, three axles and multi axles trucks weighted average Equivalent Standard Axle (ESA) per vehicle was calculated. Similarly, weighted average (ESA) per vehicle is calculated for the same traffic compositions but for permissible GVW. Based on the ESAs and annual traffic, total ESAs for overloaded as well as for normal traffic are estimated. Road maintenance cost for normally loaded condition (i.e. “Without Overloading Case”) was taken from DoR norms and Integrated Annual Road Maintenance Plan (IARMP), DoR, 2013/2014. However, road maintenance cost for overloaded cases, HDM-4 was used to estimate the maintenance cost with same repair policy as set by the DoR. The increase in maintenance cost in “With Overloading Case” is regarded as the additional maintenance cost required due to vehicle overloading and the cost is to be collected from the offenders of permissible limit as the overloading fines. As per estimated fine schedule, overloading fine for up to 1 tonne overload is NRs 362 per km overloaded distance.

Further, the distanced based overloading fine is considered to fully recover the road damage to be caused by vehicle overloading. Also, in order to discourage repeated overloading by the same vehicle, the fine will be compounded as the number of offences increase. Only cash payment will be accepted and it has to be paid at weighbridge station. As for institutional arrangement, it is recommended to establish Axle Load Control Management Information System (ALC-MIS) in DoTM because it will be more effective in enforcement of axle load control in transparent way. The weighbridge station should issue a

Weighbridge Clearance Certificate of Weight (WCC) only to those vehicles that are legally loaded. Holding of this weighing slip from the automated weighing stations should be made mandatory.

मुख्य-संक्षेप

सडकमा गुड्ने सवारी साधनहरुले बोक्ने भारको अत्याधिक मात्राले सडकको सतहहरु कम समयमै विग्रने र पुलहरुमा पनि क्षती हुने गर्दछ । सडक सतह विग्रने मुल कारणमा अत्याधिक चाप पर्ने र अन्तत सतह नै विग्रने गर्दछ । कुनै सडकको लागि तय गरिएको अधिकतम भार क्षमता भन्दा दोव्वर भार भएको सवारी साधनले एकै पटकमात्रै अन्य सामान्य भार वोकेको साधन भन्दा १६ पटक आवात जावत गर्ने भार बराबरको चाप दिने गर्दछ । यसै कारण सवारी साधनको अत्याधिक भारले गर्दा सडक सतह चाडैं विग्रि, सडक संभार खर्च धेरै भैरहेको छ । यस्तो समस्ययालाई कम गर्न विभिन्न प्रकारको जरिवानाको विधि, विभिन्न देशहरुमा रहेको पाइन्छ । तर नेपालमा हाल सम्म यसको निश्चित विधि रहेको पाइदैन । जरिवानाको मुल्य रु.५०० देखि रु.२००० सम्म तोकिएको भएता पनि यसको वैज्ञानिक आधार रहेको पाइदैन । यसै कारण, यस अध्ययनमा अत्याधिक भार बोक्ने सवारी साधनलाई गरिने जरिवानाको वैज्ञानिक तवरवाट निर्धारण गरि समावेश गरिएको छ ।

सवारीलाई जरिवाना गर्ने सम्वन्धी विभिन्न आधारहरु रहेका छनः जस्तै (१) आफै वढि भार नियन्त्रण गर्ने (२) अदालतीकरण नगर्ने (३) सडकलाई पुऱ्याइएको क्षतिको क्षती पूर्ती वापद लिइने जरिवाना (४) दुरीको आधारमा गरिने जरिवाना (५) चक्रवृद्धि विभिन्न आधारहरुलाई मानेर गरिएको एकमुष्ट जरिवाना ।

यस अध्ययनमा सडक संभार खर्चलाई सडकमा हुने अत्याधिक भारको कारण र यो कारण बाहेक गरी दुई तरिकाबाट हेरिएको छ । सडक संभार खर्चको आंकलन गर्न सवारीको संख्या र तिनको भारको तथ्याङ्क संकलन र अध्ययन गरियो । यो अध्ययन २०१५ को मार्च महिनामा नौबिसे/धादिङमा गरिएको थियो । दैनिक चल्ने सवारीको औषत संख्या (Annual Average Daily Trafic, AADT) र सवारीको कुल वजन (Gross Vehicle Weight, GVW) को तथ्याङ्क र यसको औषतबाट साधारण र बढि भार बोक्ने दुई प्रकारको सवारी साधनको औषत बार्षिक संख्या पत्ता लगाइयो । सडक संभार खर्च (सामान्य संचालन अथवा बढि भारको कारण बाहेक) को अनुमान सडक विभागले तय गरेकोलाई मानियो र बढि भार बोक्ने सवारीको कारण सडक संभार खर्च HDM-4 मोडेलबाट तय गरियो । संक्षेपमा अत्याधिक भारको कारण जरिवानाको रकमको हिसाब गर्दा प्रति एक टन प्रति एक किलोमिटरको लागी रु ३६२/- हुन आउने देखिएको छ।

यसरी दुरीको आधारमा जरिवानाको आधारमा यसले सडकलाई गर्ने क्षतिको आधारमा गरिएको छ । साथै, पटक पटक सो गल्ति दोहारिएमा गरिने जरिवानामा पटकै पिच्छे वढि जरिवाना पनि गर्न सकिने छ । जरिवाना रकम जुन स्थानमा जाँच गरिएको हो, सोही स्थानमा नगदमा तिर्नु पर्ने र बढी भएको वजन सवारी संचालक स्वयंले झार्नु पर्ने व्यवस्था गरिएको छ ।

यातायात व्यवस्थापन विभागले सडकमा अत्याधिक भार बोक्ने सवारी साधनको नियन्त्रण गर्न भार वहन नियन्त्रण सुचना व्यवस्था प्रणाली (Axel Load Control Management Information System, ALS-MIS)

विधिको उपयोग गर्न अति आवश्यक छ । भार मापन केन्द्रहरुले सवारीको भार बहन तौलको पूर्जी दिने व्यवस्था हुनपर्ने र सवै मालवाहक सवारीहरुले यो पूर्जी लिनु बाध्यात्मक व्यवस्था गर्नु पनि आवश्यक देखिन्छ ।

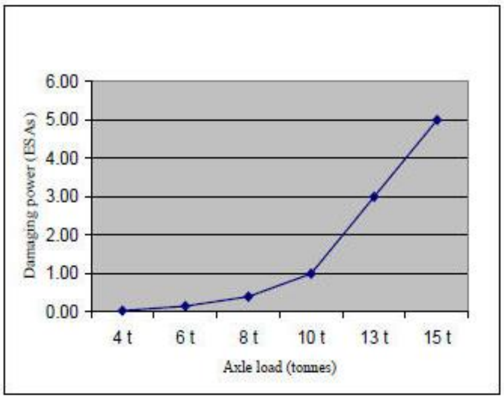
CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

The vehicle overloading is one of the major contributors for early deterioration of the pavement condition and bridge fatigue damage. Vehicle overload control or axle load control is very important to achieve the full life of the road pavement and attain the expected return from the investment on road infrastructures. AASHTO road tests carried out on a large range of pavement thickness and vehicle loads revealed that overloading due to the intense stress that the overloaded vehicle imposes on the pavement inflicts damage that is proportional to the fourth power of the overload. A damaging effect to the road pavement due to the vehicle that carries twice the permissible load brings about the damage to the road pavement that 16 repetitions of the normally loaded vehicle axle would have imposed. An exponential relationship between axle loads and damaging power of vehicle overloading is shown in **Table 1-1** .

Table 1-1 Damaging Effect of Overloading and Its Effect on Pavement Life

1. Damaging Effect of Overloading (AASHTO Road Tests)



$$LEF = \left(\frac{P}{W_s}\right)^n$$

Where,

LEF: Load Equivalence Factor

P= Axle Load

Ws = Standard Axle (8.2 tonnes)

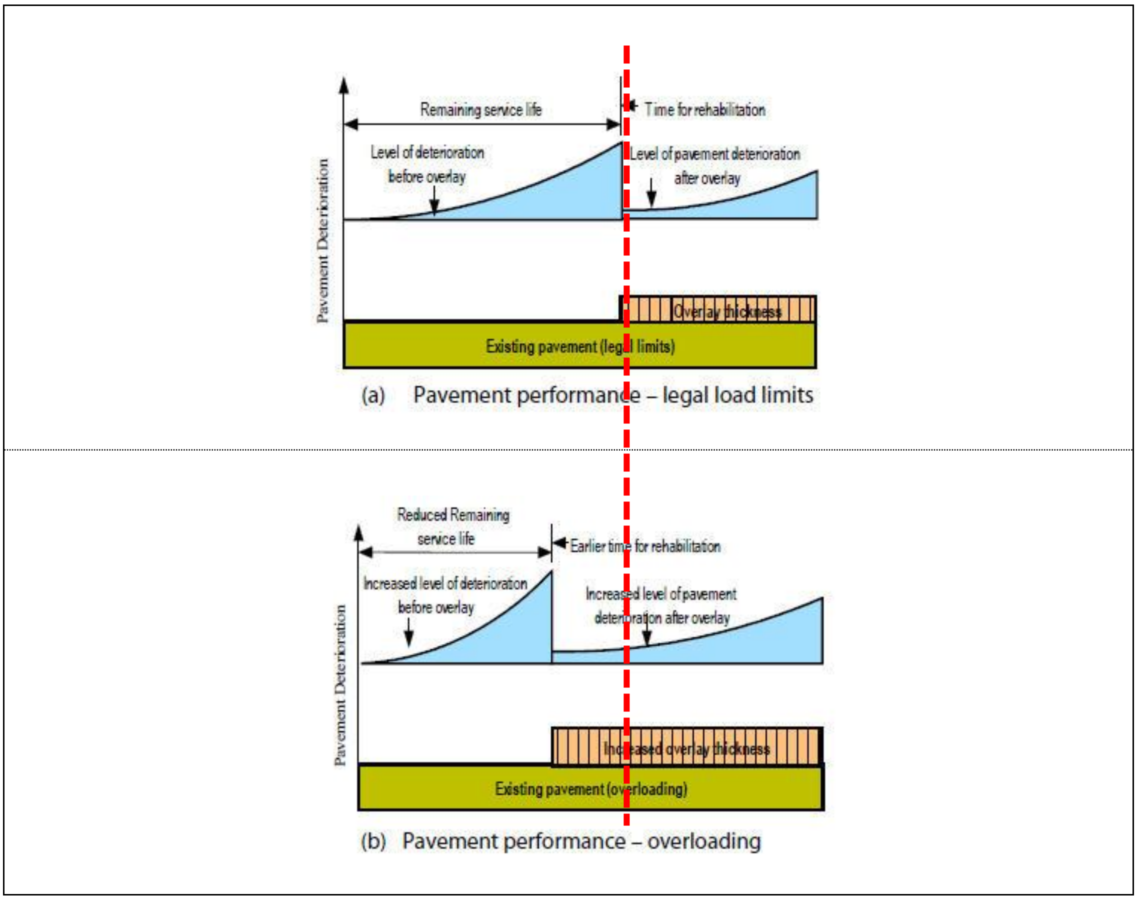
n = power law exponent

(typically assumed to be 4.2)

2. Effect of Axle Loads on Pavement Life (AASHTO Road Tests)

Design Axle Load	Carried Axle Load	Equivalence Factor			Payment life (years) for varying power exponent		
(Tons)	(Tons)	n = 4	n=4.5	n=5.0	N = 4.0	N = 4.5	N = 5.0
10.0	10.0	1.0	1.0	1.0	20.0	20.0	20.0
10.0	11.0	1.5	1.5	1.6	12.9	12.9	12.4
10.0	12.0	2.1	2.3	2.5	8.8	8.8	8.0
10.0	13.0	2.9	3.3	3.7	6.1	6.1	5.4
10.0	15.0	5.1	6.2	7.6	3.2	3.2	2.6

3. Impacts of Overloading on Pavement Performance



Unless the problem is tackled effectively, there will be no sustainable improvement in the condition of the road networks despite the large amount of investment in road maintenance and rehabilitation.

1.2 SCOPE AND OBJECTIVE

The scope and objective of this study is to review, assess and recommend the charges / fees / fines with suitable payment modalities. The study will also recommend a standard process through which such charges / fees / fines could be updated on the regular basis.

1.3 DEFINITION

Axle: The common axis of rotation of one or more wheels, whether power driven or freely rotating, and whether in one or more segments and regardless of the number of wheels carried thereon.

Axle Load: The axle load of a wheeled vehicle is the total weight felt by the roadway for all wheels connected to a given axle. Viewed another way, it is the fraction of total vehicle weight resting on a given axle. Axle load is an important design consideration in the engineering of roadways and railways, as both are designed to tolerate a maximum weight-per-axle (axle load); exceeding the maximum rated axle load will cause damage to the roadway or rail tracks.

Cross Border Freight: The freight which crosses the border of the adjacent countries either on the same freight vehicle or transferred to another freight vehicle. The freight vehicle might be truck, railway, ship, aircraft, etc.

Equivalent Standard Axle Load (ESAL): Most commonly accepted indicator to equate damage from wheel loads of various magnitudes and repetitions to damage from an equivalent number of "standard" axle loads, one of which is a 8.2 tones (18,000 pound) single axle (the equivalent standard axle or EAS).

Gross Vehicle Weight: It is the total weight of the vehicle (including pay load) as specified by the manufacturer

Overload: An axle load, a load from a group of axles, or gross vehicle mass on a vehicle that exceeds the prescribed legal limits for the vehicle or for any particular part of public roads.

Overloading Fine/Charges: An amount of penalty that is enforced by the regulator against the vehicle overloading.

Truck: A motor vehicle designed, used or maintained primarily for the transportation of goods.

Traffic Volume: Number of vehicles of different categories plying on the road and it depends on duration of counting.

Weighbridge: A mechanical device or facility designed and installed to weigh a vehicle and its laden mass.

1.4 STRUCTURE OF THE REPORT

This report consists of four (4) chapters followed by one (1) appendix. Details of each chapter and appendix are shown below.

Chapter 1: This chapter provides background of the study, scope and objectives of the study, and structure of the report.

Chapter 2: This chapter attempts to review the national and international practices in charging against the vehicle overloading.

Chapter 3: This chapter attempts to develop a standard process in estimating level of fines / charges / fees with suitable payment modalities.

Chapter 4: This chapter attempts to estimate and recommend the level of the overloading charging and payment modalities.

CHAPTER 2 REVIEW OF NATIONAL AND INTERNATIONAL PRACTICES ON OVERLOADING FINES AND PAYMENT MODALITIES

2.1 NATIONAL PRACTICE

As per Sub-article 160 (2) of MVTMA 1993, the penalty for exceeding the load limit currently range from Rs. 500 to Rs.2000. As per the act above, vehicles violating the permissible load limit need to off-load the excess freight and pay the fine. The prevailing charges applicable are too nominal to discourage overloading.

(1) Charges/Fees/Fines

The following overloading charges provisions are made in the overloading regulatory documents.

Table 2-1 Prevailing Provision on Overloading Charges

Rs 500 – 2,000	Article 160(2); MVTMA 1993
Up to Rs 2,000	Article 30, Public Road Act
Rs 500 – 2,000	Article 9.1, Cargo Carries Load Regulating Directive, 2014

DoTM is responsible for collection of overloading charges. However, DoTM granted the authority to traffic police to collect overloading charges up to NRs 1,000. If the overloading fine is more than NRs 1,000, DoTM shall collect the charges by themselves. However, it is not clear why the maximum limit of NRs 1,000 is set for collection of overloading charge by traffic police.

(2) Payment Modalities

Cargo Carries Load Regulating Directive 2014 stipulates that overloading charges shall be paid in the nearest zonal transport management office or traffic police office in the equal amount as indicated in the load sheet received from the weighbridge station. Without paying overloading charges and offloading the overloaded weight, vehicles are not allowed to ply on the road. It is not clear whether charges are accepted other than in cash in the current fine collection practice.

2.2 INTERNATIONAL PRACTICE

Since vehicle overloading is a global problem, various regulatory provisions are practiced in several countries however the effectiveness of enforcement varies country by country. International practices of some selected countries are shown in **Table 2-2**.

Table 2-2 International Practices in Overloading Charging

Country	Overloading Charging Practices
India	Section 194 in Motor Vehicle Act 1988, dealing with driving a vehicle exceeding permissible weight is liable to be punished, for the first offence with fine which may extend to Indian Rupees two thousand (2,000) and for any second or subsequent offence with fine which may extend to Indian Rupees three thousand.
Japan	Both vehicle owner and driver are accountable for penalties. The offense of regulatory provisions may extend up to ceasing of driver licensing (for driver) and permit for operating truck (for truck operators).

Table 2-3 Penalties against Vehicle Overloading

Truck Operators	Level of Overloading	1st Time	2nd Time	3rd Time	4th Time
	Less than 50%	10D*VNV	30D*VNV	80D*VNV	200D*VNV
	50 % to 100%	20	50	130	330
	More than 100%	30	80	200	500
VNV: Violated Number of Vehicle					
Drivers	Level of Overloading	Heavy Vehicle		Light Vehicle	
		Points	Fine		Fine
	Less than 50%	2	30,000	1	25,000
	50 to 100%	3	40,00	2	30,000
	More than 100%	6	License Cease	3	35,000

<table>
<tr><th>Country</th><th>Overloading Charging Practices</th></tr>
<tr><td>Kenya</td><td>
Vehicle overloading is checked at the weighbridge stations along the major corridors by KeNHA. The police also work with KeNHA at the weighbridge stations and are responsible for taking drivers of overloaded vehicles to court. The overloading fines are ultimately charged and collected by the court and transferred to the general budget. Overloading fines are as shown in Table 2-4.
Table 2-4 Vehicle Overloading Charging in Kenya
<table>
<tr><th rowspan="2">Degree of Overloading per Axle or Excess Gross Vehicle Weight in Kilograms (kg.)</th><th colspan="2">Fine (KES)</th><th colspan="2">Fine (US$)</th></tr>
<tr><th>1st Conviction</th><th>2nd or Subsequent Conviction</th><th>1st Conviction</th><th>2nd or Subsequent Conviction</th></tr>
<tr><td>Less than1.0 t</td><td>5,000</td><td>10,000</td><td>51.2</td><td>102.4</td></tr>
<tr><td>1.0 t or more but less than 2.0 t</td><td>10,000</td><td>20,000</td><td>102.4</td><td>204.7</td></tr>
<tr><td>2.0 t or more but less than 3.0 t</td><td>15,000</td><td>30,000</td><td>153.5</td><td>307.1</td></tr>
<tr><td>3.0 or more but less than 4.0 t</td><td>20,000</td><td>40,000</td><td>204.7</td><td>409.5</td></tr>
<tr><td>4.0 t or more but less than 5.0 t</td><td>30,000</td><td>60,000</td><td>307.1</td><td>614.2</td></tr>
<tr><td>5.0 t or more but less than 6.0 t</td><td>50,000</td><td>100,000</td><td>511.8</td><td>1023.6</td></tr>
<tr><td>6.0 t or more but less than 7.0 t</td><td>75,000</td><td>150,000</td><td>767.7</td><td>1535.5</td></tr>
<tr><td>7.0 t or more but less than 8.0 t</td><td>100,000</td><td>200,000</td><td>1023.6</td><td>2047.3</td></tr>
<tr><td>8.0 t or more but less than 9.0 t</td><td>150,000</td><td>300,000</td><td>1535.5</td><td>3070.9</td></tr>
<tr><td>9.0 t or more but less than10.0 t</td><td>175,000</td><td>350,000</td><td>1791.4</td><td>3582.8</td></tr>
<tr><td>10.0 t or more</td><td>200,000</td><td>400,000</td><td>2047.3</td><td>4094.6</td></tr>
</table>
Source: Study for Harmonization of Vehicle Overloading Control in the East African Community, JICA, 2011
</td></tr>
</table>

Country	Overloading Charging Practices
Tanzania	The charge is described as a vehicle overloading fee, and not a penalty or fine. The overloading fee is charged according to two values (axle load when loaded and gross weight of the vehicle), depending on the excess weight. It is collected by TANROADS and directly transferred to the Road Funds Board.

Table 2-5 Schedule of Overloading Fees for Maximum Gross Vehicle Weight

GVM Overload (t)	Fees (US$)	GVM Overload (t)	Fees (US$)
0.5	22	16.5	2,331
1.0	45	17.0	2,536
1.5	70	17.5	2,760
2.0	95	18.0	3,006
2.5	122	18.5	3,275
3.0	150	19.0	3,569
3.5	180	19.5	3,893
4.0	211	20.0	4,248
4.5	244	20.5	4,638
5.0	279	21.0	5,067
5.5	316	21.5	5,538
6.0	355	22.0	6,057
6.5	397	22.5	6,628
7.0	441	23.0	7,258
7.5	489	23.5	7,952
8.0	539	24.0	8,716
8.5	593	24.5	9,560
9.0	651	25.0	10,491
9.5	712	25.5	11,519
10.0	779	26.0	12,653
10.5	850	26.5	13,906
11.0	926	27.0	15,291
11.5	1,009	27.5	16,821
12.0	1,098	28.0	18,512
12.5	1,195	28.5	20,381
13.0	1,299	29.0	22,448
13.5	1,412	29.5	24,735
14.0	1,535	30.0	27,264
14.5	1,668	30.5	30,062
15.0	1,813	31.0	33,158

Source: Report on Vehicle Axle Load Regulation & Management, Odisha State Roads Project, India

Country	Overloading Charging Practices
Burundi	The fines for axle overloading is to be paid for vehicles exceeding the maximum axle limits, which are defined as 10 tonnes for a single axle, 16 tonnes for a double axle, and 24 tonnes for a triple axle. Although the level of fines is defined as BIF 2,000 (*US$ 1.29*) in Ordinance No. 660/206 dated 11 September 1958, it is not enforced since there are now weighbridges controlled by the police, who are responsible for collecting fines for axle overloading.
Rwanda	The traffic police is responsible for checking if vehicles are overloaded or not and reporting to the Revenue Authority if they find an overloaded vehicle. However, since there is no weighbridge controlled by the traffic police, they have to determine if vehicles are overloaded by sight. The overload fine is in the range RWF 20,000 ~ 180,000 (*US$ 27.74 ~ 249.65*) for first and subsequent offenses, respectively.
Uganda	Fines are collected by Uganda National Roads Authority (UNRA) and following fine provisions are made in the regulatory document. UGX 300,000–600,000 (US$98.50 ~ 196.97) (first and subsequent offenses, respectively) +UGX 200,000 (*US$ 65.65*) for each day the offense continues +UGX 600,000 (*US$ 196.97*)
Note: *The following exchange rates are used for converting local currencies in to US$.* *1 US$ = 97.69 KES* *1US$ = 1547 BIF* *1US$ = 721 RWF* *1US$ = 3,046 UGX*	

CHAPTER 3 BASIC PRINCIPLE OF VEHICLE OVERLOADING FINES

3.1 BASIC POLICY

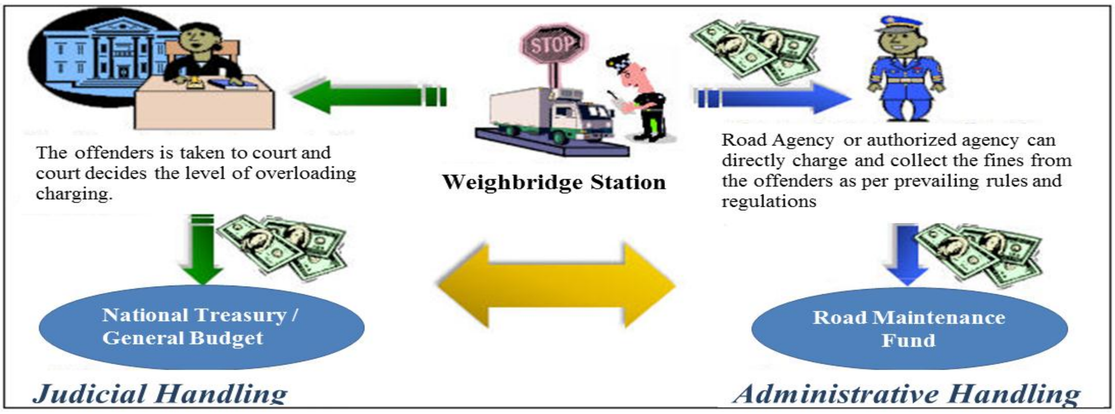
3.1.1 Towards Self-regulation in Vehicle Overloading

The ultimate goal of the vehicle overloading charging is to discourage the vehicle overloading. The fund generated from vehicle overloading charges is not sufficient in recovering the road conditions in any cases. In many countries, the miss use of vehicle overloading charges is also becoming a big issue because overloading charges either collected without keeping proper evidence or not deposited / spent in the road maintenance fund. Therefore, level of charges and its payment modalities shall be straightforward so that maximum unhealthy practices in collecting and utilizing overloading fines will be eliminated.

Once the vehicle is loaded and plied on the road, its offloading to maintain the permissible load limit derived so many complications in handling overloaded mass. Therefore, strategy in setting overloading charging and payment modalities shall be set in a smart way so that offenders will turn into self-regulator in controlling vehicle overloading.

3.1.2 Decriminalization of Vehicle Overloading

The current practice of handling of vehicle overloading in Nepal is administrative. This provision shall keep as it is without any alteration because handling of vehicle overloading administratively is more effective than judicially. Criminalization of vehicle overloading may consequence the long delays suffered by prosecuting offenders judicially and fines decided by the court may not be adequate in relation to the economic damage caused by overloading. Furthermore, fines collected from vehicle overloading is collected in national treasury rather than in road maintenance fund. Decriminalization of vehicle overloading will facilitate in securing an immediate and administratively effective sanction that prevents the additional damage to the pavement as a result of the overloading.



3.1.3 Level of Overloading Charges

a. Recovering Road Damage Cost

In order to make liable of damages caused by vehicle overloading, overloading charges should be set based on the principle of recovering road damage cost. The road damage cost should be defined based on the long-run marginal costs and should include cost of all types of maintenance works, namely routine maintenance, periodic (recurrence) maintenance, and rehabilitation and reconstruction.

b. Tolerance on Permissible Load Limit

The maximum tolerance on permissible load limit should not exceed 5%. However, such tolerance should be permitted for only limited time in a year in order to discourage to be benefited from tolerance provision.

c. Distance Based Charging

Distance based vehicle overloading charging should be adopted in order to accommodate the extent of damages caused by overloaded vehicle not only by the weight but also the distance traveled by the overloaded vehicle. The distance factor should be considered while calculating the overloading fines at the weighbridge station.

d. Multiple Offence

In order to discourage the repeated violation of permissible load limit by the same vehicle, multiple offences should be considered while calculating the overloading charges.

3.1.4 Liability Sharing

In order to discourage vehicle overloading by driver and vehicle owner, sharing of liability between driver and vehicle owner should be considered. The overloading fines to be paid in total should be shared among driver and vehicle owner.

Table 3-1 Liability Sharing of Vehicle Overloading

Offenders	Type of Charges
Driver	Cash + negative point in his/her driver license. Upon reaching certain limit of point, driving license should be ceased.
Vehicle Owner	Cash + negative point in permitting vehicle to ply. Upon reaching a certain limit of point, permission to operate vehicle should be aborted.

3.1.5 Setting Payment Modality

Vehicle overloading charges estimated based on the overloaded mass, distance traveled and multiple offenses of vehicle should be paid in cash on the spot at weighbridge stations or the nearest transport management office. The overloaded vehicle should not be released unless the fines are paid. In case of unscheduled vehicle overloading checking in the places other than weighbridge station and vehicle is found overloaded, the overloading fines should be paid in cash on the spot to the authorized person / agency (DoTM or Traffic Police). Depending upon the availability of space and security of the offloaded mass, DoTM or traffic police officials may instruct the overloaded vehicle to go to the nearest weighbridge stations or places specified by the enforcing / regulating agency. The general flow of vehicle weighing until the releasing of vehicle is shown in **Figure 3.1**.

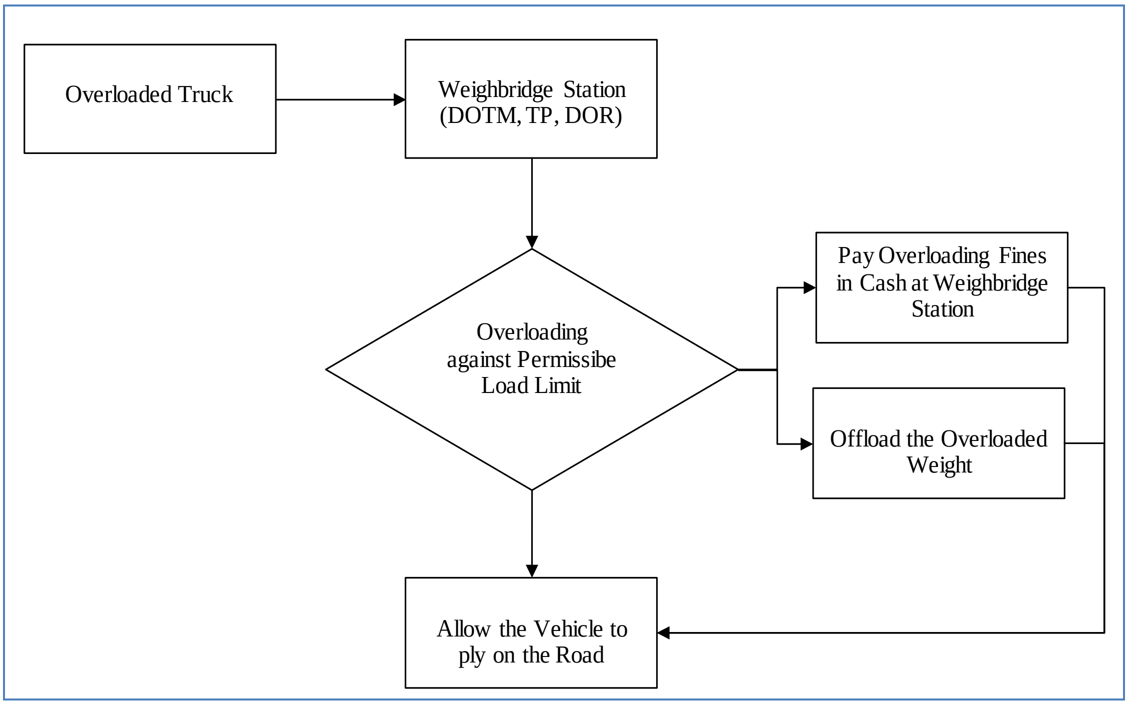


Figure 3.1 General Flow of Overloading Control

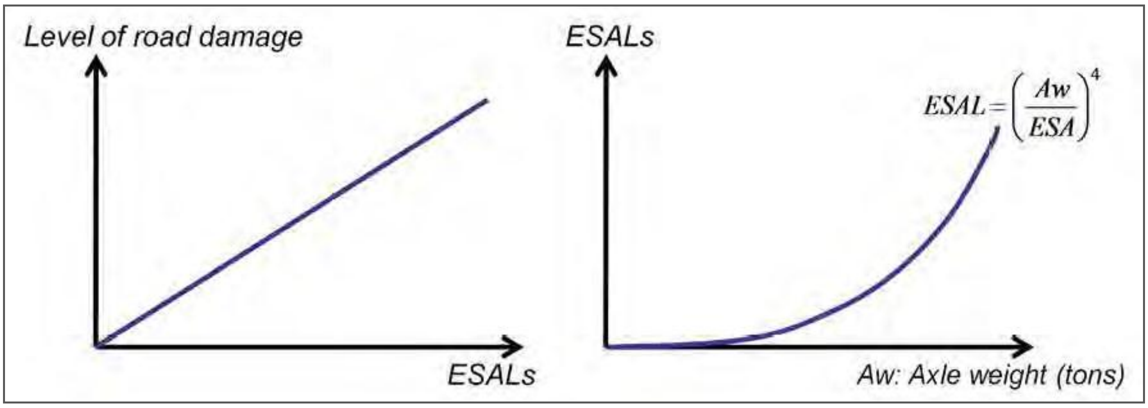
3.1.6 Adjustment and Management of Overloaded Mass

Upon careful weighing of axle load and GVW, if vehicle is found overloaded, overloading mass should be offloaded by offenders themselves. All vehicles after offloading of overloaded mass should be weighed again to confirm that GVW is within the permissible limit. A maximum 5% tolerance three times a year is permitted. The storing and security of such offloaded mass should be managed by offenders themselves.

CHAPTER 4 ESTIMATION OF THE LEVEL OF OVERLOADING CHARGING

4.1 METHOD OF ESTIMATION

Based on the principles proposed in Chapter 3, the level of overloading charges was estimated to be proportional to the travel distance and equivalent standard axle loads (ESALs) caused by the overloading. ESAL is the most commonly accepted indicator to equate damage from wheel loads of various magnitudes and repetitions to damage from an equivalent number of "standard" loads. The relation among level of road damage, ESAL, and axle weight is shown in **Figure 4.1**.



Source: Study for Harmonization of Vehicle Overloading Control in the East African Community, JICA, 2011

Figure 4.1 Level of Road Damage due to Vehicle Overloading

Figure 4.1 shows the relationship among level of road damage, ESAL, and axle weight estimation. The estimation was conducted using the total road maintenance cost for the selected road section by analysis with HDM-4. Typical loading and road maintenance cost of with and without overloading cases for selected road section was assumed. Road maintenance costs were calculated for routine maintenance, recurrent and periodic maintenance. Traffic volume and overloading condition was taken from the results of axle load survey conducted by the Study.

4.2 LEVEL AND SCHEDULE OF VEHICLE OVERLOADING CHARGES

The following five models were considered in deciding the level and schedule of vehicle overloading charges.

(1) Method 1: with Consideration of Overloaded Weight and Distance Only

In order to calculate the level of charge by different axle weight, the following formula was considered in calculating the level overloading charges:

$$C = \left\{\left(\frac{AW}{ESA}\right)^{4.5} - \left(\frac{AL}{ESA}\right)^{4.5}\right\} \times d \times UC$$

Where,

C: Level of charge (Rs);

Aw: Actual Axle weight (tonne);

Al: Axle weight limit (tonne);

d: Travel distance (km); and

UC: Unit Maintenance Cost per km of the particular year (Rs)

ESA: Equivalent Standard Axle, which is set as 10.2 tonne.

(2) Method 2: with Consideration of Overloaded Weight, Distance and Multiple Offences

In order to calculate the level of charge by different axle weight, the following formula was considered in calculating the level overloading charges:

$$C = \left\{ \left(\frac{AW}{ESA} \right)^{4.5} - \left(\frac{AL}{ESA} \right)^{4.5} \right\} \times d \times M \times UC$$

Where,

C: Level of charge (Rs);

Aw: Actual axle weight (tonne);

Al: Axle weight limit (tonne);

d: Travel distance (km); and

M: Multiple offense (number)

UC: Unit Maintenance Cost per km of the particular year (Rs)

ESA: Equivalent Standard Axle, which is set as 10.2 tonne.

This method is the most comprehensive because it includes distance, multiple offense, and overloaded weight, and maintenance unit cost rate of each year

(3) Method 3: without Consideration of Overloaded Weight Only

In order to calculate the level of charge by different axle weight, the following formula was considered in calculating the level overloading charges:

$$C = \left\{ \left(\frac{AW}{ESA} \right)^{4.5} - \left(\frac{AL}{ESA} \right)^{4.5} \right\} \times UC$$

Where,

C: Level of charge (Rs);

Aw: Actual axle weight (tonne);

Al: Axle weight limit (tonne);

d: Travel distance (km); and

UC: Unit Maintenance Cost per km of the particular year (Rs)

ESA: Equivalent Standard Axle, which is set as 10.2 tonne.

(4) Method 4: with Consideration of Consumer Price Index (CPI)

In order to calculate the level of charge by different axle weight, the following formula was considered in calculating the level overloading charges:

$$C = \left\{ \left(\frac{AW}{ESA} \right)^{4.5} - \left(\frac{AL}{ESA} \right)^{4.5} \right\} \times d \times UC \times \left(1 + \frac{CPI}{100} \right)$$

Where,

C: Level of charge (Rs);

Aw: Actual axle weight (tonne);

Al: Axle weight limit (tonne);

d: Travel distance (km); and

UC: Unit Maintenance Cost per km of the base year (Rs)

CPI: Average Consumer Price Index from the base year to the particular year (%)

ESA: Equivalent Standard Axle, which is set as 10.2 tonne.

If this method is adopted, calculation of unit maintenance cost (UC) is not required because the price escalation factor is cover by CPI. If annual updating of overloading schedule

(5) Method 5: with Consideration of Overloaded Weight, Distance, Multiple Offenses

In order to calculate the level of charge by different gross vehicle weight, the following formula was considered in calculating the level overloading charges:

$$C = \{Gw - Gl\} \times d \times M \times UC$$

Where,

C: Level of charge (Rs);

Gw: Actual gross vehicle weight (tonne);

Gl: Gross vehicle weight limit (tonne);

d: Travel distance (km);

M: Multiple offense (number); and

UC: Unit Maintenance Cost per km of the base year (Rs)

4.3 ESTIMATION OF OVERLOADING CHARGES AND PAYMENT MODALITY

4.3.1 Estimation of Overloading Charges and Schedule of Overloading Charges

The Study Team had carried out traffic and axle load surveys in Dharke, Gaidakot and Hetauda on 10, 11 and 12 March, 2015 respectively. Annual Average Daily Traffics (AADT) and Gross Vehicle Weights (GVW) were calculated based on results of the surveys. When examined the AADTs and GVWs of Dharke is found to be representative for the estimation of overloading fees. The same traffic volume and GVW were used for the maintenance cost estimation. The traffic is projected for ten years with 7.0 % annual growth rate to cover design life of the road. Based on traffic compositions and GVW of two axle vehicle, three axles and more axles trucks weighted average Equivalent Standard Axle (ESA) per vehicle is calculated as shown in **Table 4-1**. Similarly, weighted average (ESA) per vehicle is calculated for the same traffic compositions but for normal allowed GVWs. Based on the ESAs and annual traffic, total ESAs for overloaded as well as for normal traffic are estimated. Details of calculations are shown in **Table 4-1**.

The pavement routine maintenance cost and recurrent maintenance cost are estimated at NRs.50,000.00 per kilometer per year and NRs.70,000.00 per kilometer per year respectively. The functional overlay (periodic maintenance) is assumed to be provided in every 6th year after the starting point at the cost of NRs.2,800,000.00 per kilometer. These costs are based on provisions made in DoR norms and Integrated Annual Road Maintenance Plan (IARMP), DoR, 2013/14.

Table 4-1 Estimation of Overload Charge (with Truck Traffic at Dharke)

Year	AADT	Annual Traffic (Million)	Loaded (Wtd. ESA/Veh)	Loaded (Million ESA)	Normal (Wtd. ESA/Veh)	Normal (Million ESA)	Maint. Cost (Million Rs./Km)
2015	2978	1.09	6.83	7.425	1.651	1.794	0.12
2016	3186	1.16	6.83	7.945	1.651	1.920	0.12
2017	3410	1.24	6.83	8.501	1.651	2.054	0.12
2018	3648	1.33	6.83	9.096	1.651	2.198	0.12
2019	3904	1.42	6.83	9.732	1.651	2.352	0.12
2020	4177	1.52	6.83	10.414	1.651	2.517	2.80
2021	4469	1.63	6.83	11.143	1.651	2.693	0.12
2022	4782	1.75	6.83	11.923	1.651	2.881	0.12
2023	5117	1.87	6.83	12.757	1.651	3.083	0.12
2024	5475	2.00	6.83	13.650	1.651	3.299	0.12
PV		7.970		54.443		13.156	2.036
PV/Day		0.0022		0.0149		0.0036	0.0006
						Fee for Overload of 1 ton =	0.000362

Source: The Study Team's Traffic and Axle Load Survey, March 2015

The annual maintenance expenditures required during next ten years and total ESAs of ten years are converted to their present worth in the year 2015 and annualized to obtain an unit base values. These values are applied in the above formula to obtain schedule of charges for overloading per kilometer and presented in **Table 4.1**. The charges are in line with those practiced in other countries as shown in above sections.

Table 4-2 Recommended Schedule of Overloading Charge

GVW Overload (Kg)	Fees (Rs./Km) [First Offense]	Fees (Rs./Km) [Second Offense]	Fees (Rs./Km) [Third Offense]
0-1000	362	724	1,086
1000-2000	852	1,704	2,556
2000-3000	1,504	3,008	4,512
3000-4000	2356	4,712	7,068
4000-5000	3,451	6,902	10,353
6000-7000	4,839	9,678	14,517
7000-8000	6,573	13,146	19,719
8000-9000	8,716	17,432	26,148
9000-100000	11,332	22,664	33,996
10000-11000	14,495	28,990	43,485
11000-12000	18,285	36,570	54,855
12000-13000	22,786	45,572	68,358
13000-14000	28,092	56,184	84,276
14000-15000	34,303	68,606	102,909

Source: The Study Team, March 2015

Overloading charges presented in **Table 4-2** does not include the road accident cost. This fine structure is applicable for the whole strategic road network and other roads if the pavement surface is tentatively similar to strategic roads. As for transportation of special goods which are not breakable/separable such as transporting hydropower equipment, and their weight exceeds the legal limit, a special permission is required from the DoTM. The overloading charge and other requirements will be as per the conditions of granting the special permission.

4.3.2 Payment Modalities

Above vehicle overloading charges should be obtained in cash on the spot at weighbridge stations. In case of unscheduled vehicle overloading check carried out in other than in fixed weighbridge stations, the driver shall pay overload charges in the nearest transport management office or traffic police if accepted / instructed by the unscheduled vehicle overloading check team. In the current statutory provisions, all fines collected from the vehicle overloading shall be deposited in national treasury (i.e. state revenue).

Distance based vehicle overloading charging should be obtained based on distance traveled between overloading origin to the weighbridge stations. The charges should be obtained the multiplying charges as indicated in **Table 4-2** by distance traveled.

In order to discourage the repeated violation of permissible load limit by the same vehicle, multiple offences should be considered while calculating the overloading charges as shown in **Table 4-2.**

4.4 INSTITUTIONAL ARRANGEMENT

Department of Transport Management and Traffic Police should work together to enforce overloading charges. If weighbridge is operated by private sector, the private sector will also be a part of implementing agencies. A close interactions must be developed between the personnel of the institutions. The various procedures to be followed by the organizations should be documented in an weighbridge operation guidelines. The existing regulatory provisions should not cause any hurdle for collecting overloading fines by the weighbridge operating institution. For instance, at the moment traffic police cannot collect more than NRs 1,000 from the overloaded vehicles as a fine. Any fine amount bigger than NRs 1,000 can collect only by DoTM officials. Any institution (public or private) which is authorized to collect overloading fines should have full mandate to collect any amount of fines as per fine schedule. They should not be limit to maximum amount of NRs 1,000.

All freight vehicles shall pass through the weighbridge stations. In case of unscheduled checking of overloading, vehicles / trucks that appear to be overloaded are first identified through manual observations by the traffic police on patrol along the roads and these vehicles / trucks should be asked to go to the specified static weighbridge station or portable weighbridge stations installed on the road for weighing the actual vehicle weight (i.e. axle load and GVW). In the case of an illegally loaded vehicle the driver must take the necessary action to adjust the load or off-load some of the load to achieve compliance with the legal limits.

If vehicle is overloaded beyond the maximum tolerance (i.e. 5%), the vehicle should pay the full overloading fines. If vehicle is overloaded within the maximum permissible tolerance at the first time, the vehicle will be released by warning them not to transport overloaded mass from the next time. The vehicle can be released without overloading fines at maximum three times if the same vehicle is carrying the weight within the permissible tolerance. If the same vehicle carries excessive overloaded mass in subsequent trips by disrespecting the warnings, the vehicle can be subject suspension or revocation or of a permit.

The Weighbridge Unit should issue a Weighbridge Clearance Certificate of Weight (WCC) only to those vehicles that are legally loaded. Holding of this weighing slip from the automated weighing stations should be made mandatory.

The following roles and responsibilities sharing are recommended among the stakeholders:

(i) Department of Transport Management: Overall management of axle load control system from the installation of weighbridge station to maintenance of Axle Load Control - Management Information System (ALC-MIS). Operation of weighbridges if operated directly by DoTM.

(ii) Traffic Police: Assist DoTM or weighbridge operators in enforcing axle load control measures.

(iii) Department of Roads: Cooperate with DoTM in providing roadside facilities is requested.

(iv) Private Sector: Operation of weighbridge operation in accordance with the financing mechanism agreed between DoTM and private sector.