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Financial Assessment of Road Maintenance of Strategic Road Network: A Case Study of Road Board Nepal

by

Deependra Shrestha

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The undersigned certify that they have read, recommend to the Institute of Engineering for acceptance, the thesis entitled "Financial Assessment of Road Maintenance of Strategic Road Network: A Case Study of Road Board Nepal" submitted by **Deependra Shrestha (071/MST/270**) in partial fulfillment of the requirements for the award of the degree of Master of Science in Transportation Engineering.

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ABSTRACT

Road Network is an important asset of a nation for economic and social development. However, roads need to be in good condition to realize their whole contribution. The Priority Investment Plan (PIP), 2012 has revealed that Nepal is losing the value of $1 billion dollars due to lack of road maintenance. Additionally, Accelerated Private and Public Investment in Infrastructure Component (APPIIC) in 2017, has identified that worsening state of road network is one of the eleven bottlenecks that inhibits development in Nepal.

RBN was established in 2002 with the sole aim to prevent roads from deteriorating with increased level of funding for maintenance, however, the telltale signs indicate otherwise. Thus, the research was conducted for financial assessment of road maintenance in Strategic Road Network (SRN). The research has evaluated the budget needed, the funding allocated, and the resource gap faced every year has been observed over the course of year.

In the absence of key intervention, the road asset will further deteriorate, and the maintenance backlog will stack up higher. The research concludes that inadequate funding for road maintenance could be one of the strong causes of lack of road maintenance in SRN. The research also suggests possible measures to enhance funding for road maintenance in SRN in Nepal.

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LIST OF ABBREVIATIONS

ADB	Asian Development Bank
APPIIC	Accelerated Private and Public Investment in Infrastructure Component
ARMP	Annual Road Maintenance Plan
BFI	Bilateral Financial Institution
BOT	Build, Operate and Transfer
DEG	German Development Finance Institution
DMC	Developing Member Country
DLP	Defects Liability Period
DoR	Department of Roads
DoLI	Department of Local Infrastructure
DoLIDAR	Department of Local Infrastructure Development and Agricultural Roads
DRO	Division Road Office
GDP	Gross Domestic Product
GoN	Government of Nepal
HRD	Human Resource Development
IARMP	Integrated Annual Road Maintenance Plan
IRI	International Roughness Index
JBIC	Japan Bank for International Cooperation
LRN	Local Road Network
LW	Length Worker
MCC	Millennium Challenge Corporation
MDB	Multilateral Development Bank
MoF	Ministry of Finance
MoPIT	Ministry of Physical Infrastructure and Transport
NDoT	National Department of Transport
ODA	Official Development Office
PBMC	Performance Based Maintenance Contract
PPP	Public Private Partnership
RA	Road Agency
RBN	Road Board Nepal

RIP	Road Improvement Project
RMMFRC	Road Maintenance and Finance Reform Committee
RMRP	Road Maintenance and Rehabilitation Project
SANRAL	South African National Roads Agency SOC Ltd.
SDC	Swiss Agency for Development and Cooperation
SDI	Surface Distress Index
SMDP	Strengthened Maintenance Division Program
SRN	Strategic Road Network
UNDP	United Nations' Development Program
USAID	United States Agency for International Development
WB	World Bank
YPO	Yearly Plan of Operations

CHAPTER ONE: INTRODUCTION

1.1 Background

It is a readily accepted fact that road network is the most important infrastructure for development of a country. Transport Infrastructures supports, and even enhances economic growth and needs to be preserved and maintained. Many economists will indubitably agree with the statement as the improvement in mobility makes trade cheaper and faster, lowers transaction and productions costs, provides access to broader labour and raw materials market, prop up and contribute to better education, tourism and all other infrastructures that amplify overall economics. However, roads need to be in proper condition to realize their whole contribution. As the condition of road network defines the vector of any nation's or state's development, they need to be properly and timely maintained. In many developing countries (ADB's DMCs) like Nepal, the status of road maintenance is found to be substandard, and the blame is often put onto inadequate funds for road maintenance. As a result of poor maintenance, the roads are being lost much before the roads can return their full utility value, degrading the nation's economy directly and indirectly.

The road network of Nepal has significantly increased over the past decade, especially rural roads. The SRN is approximately 13,500 km, with an additional 440 km of road under construction and 1,500 km planned to be constructed. Out of the total road network, only about 52% of them are sealed with bitumen course and 31% of them are earthen. The Road inventory details are presented in the Table 1-1. It is clear from the Figure 1-1 that the road asset has been increasing continuously over the years.

SRN holds significant importance to the economy of country as it ties up all the headquarters and highways together, strengthening the national mobility and economy of Nepal. Given the vitality of SRN, satisfactory maintenance of the existing road/highway asset is imperative as the report provided by SANRAL states that the repair cost rise to six times the maintenance after three years of negligence and exponentially rises to eighteen times after the five years of negligence. (Burningham & Stankevich, 2005)

Table 1-1 SRN Road Network

Survey Year	Bitumen Sealed	Graveled	Earthen	Total	Under Construction	planned
2012	5568.55	1888.49	4178.55	11635.58	413.82	2752.7
2013	6368.98	1735.49	4389.47	12493.94	315.4	2092.9
2016	6823.43	2044.22	4030.55	12898.2	363.3	1965.2
2018	6979.33	2276.87	4191.42	13447.62	442.49	1495.11

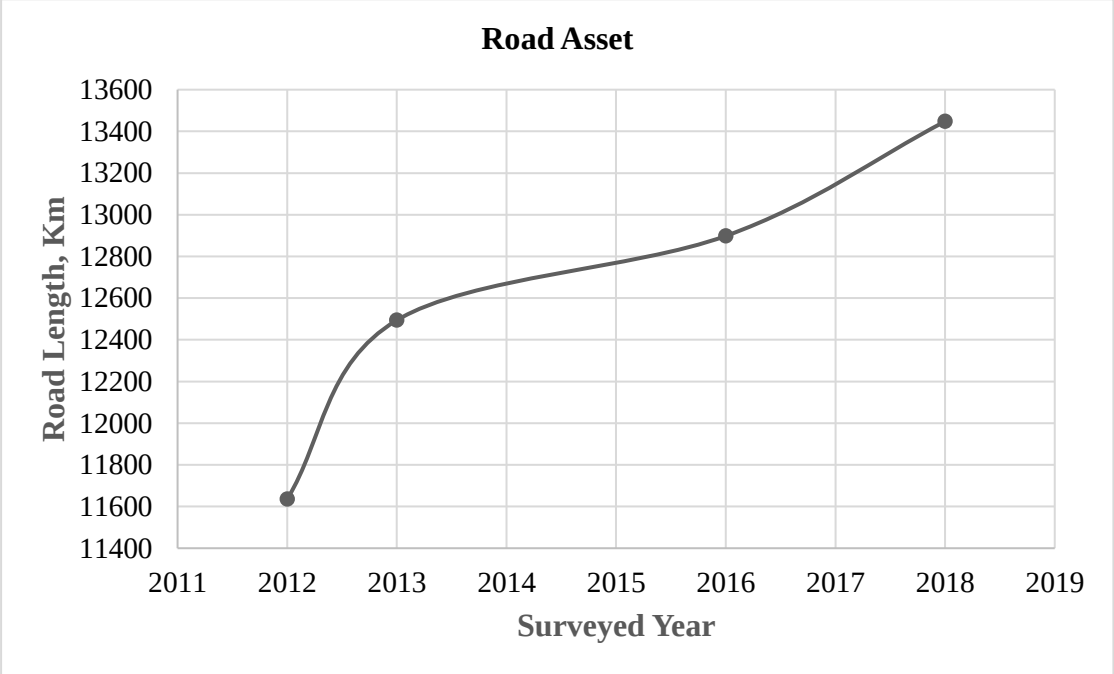

Figure 1-1 Total Strategic Road Networks

1.2 Statement of Problem

Accelerating Private and Public Investment in Infrastructure Component (APPIIC) identified that life-cycle management of Roads as one of the eleven bottlenecks contributing to delays in the development of infrastructure in Nepal. The worsening state of road network is seen as one of the major inhibitors to both domestic and inward investment. The Priority Investment Plan (PIP),2012 has also showed that Nepal is losing the value of $1 billion due to the lack of proper and enough maintenance works. The insufficient road maintenance work has effectively reduced the life of road, and in turn increasing the road user costs as vehicle operating costs

(VOC) is increased and travel time is stretched. Dogmatically, roads are not hard to fix as the technical and financial resources required for the maintenance is insignificant compared to the rehabilitation or new road construction. However, the disappearance of road still remains as the ex post facto. The research is conducted based on the following statements of problems:

a) The roads in Nepal are disappearing (Or at least pavements are being lost into muddy, or dusty, or potholed dirt and gravel.)
b) Despite having an institution (RBN) dedicated to maintenance, roads lack maintenance. As per the reports, the funds are insufficient to holistically carryout maintenance.(Maintenance Branch, DoR, 2018/19)

1.3 Research Objective

The main objective of this research is to assess the financial status of road maintenance of SRN in Nepal. The specific objectives are:

a) To assess the pavement condition of SRN in terms of SDI and IRI,
b) To assess the maintenance fund in terms of budget required, budget allocated, and budget deficit,
c) To assess the sources of revenue for road maintenance fund,
d) To assess the expenditure efficiency of available maintenance budget.

1.4 Limitations of the Study

Insufficient road maintenance can be attributed with inadequate funds and/or ineffective and inefficient funds exhaustion, poor Contractual Management, Operation and Maintenance policies. The faulty design of pavement at the inception of road could be the major contributor to untimely degradation of roads. However, the research is focused solely on the financial aspect of the maintenance system. The paper will also make suggestions on how the problem can be mitigated based on the international practices on which further research will have to be conducted.

1.5 Organization of Thesis

This report has been presented in five chapters. First chapter deals with the Introduction to the study. It entails the background, statement of problems, research objective and the limitations and scope of study. Chapter two provides detailed

literature reviews focusing on the subject of study. In broad, literature review regarding the road maintenance practices in Nepal, their planning and budgetary process, the sources and instruments of road financing and emerging international practice in road financing has been conducted. Chapter three discusses the methodology adopted for the purpose of study while chapter four provides the data presentation, results derived, and the discussions made on the consecution. Chapter five make conclusion and recommendation on the subject matter.

CHAPTER TWO: LITERATURE REVIEW

2.1 Road Maintenance Practices in Nepal

Road maintenance is the process of planning and enacting tasks to optimize pavement condition and performance so that the safety of traffic is ensured, serviceability and appearance is sustained, and the operation cost of vehicles is minimized. Maintenance incorporates all kinds of activities (routine, recurrent, periodic, emergency maintenance) that help a country's road network operate indefinitely. The vitality of road maintenance is recognized worldwide; still the earmarked amount for the maintenance is only 20 to 50 percent of the estimated cost.(Burningham & Stankevich, 2005). Planned road maintenance is one of the key strategies of DoR. The maintenance activities recognized and practiced by DoR are explained as follows:

2.1.1 Routine Maintenance

This maintenance are those treatments that are applied to a pavement, so that the pavement functionality is kept intact. This type of maintenance measure is adopted to ensure unhindered movement of daily traffic and to counteract the detrimental effects of environmental weathering. It includes activities like grass cutting, drain cleaning, debris removal, water dewatering from carriageway and cross-drainage structures, road furniture maintenance etc.

It is conducted through the length workers (LWs) or through gang labour. Generally, LWs are engaged from the close vicinity of the road location. LWs are trained once in a year and their works are planned and supervised by the supervisors, technical staffs of Division Road Office (DRO) as per the contract. The norms have made provision that road section to be maintained by LWs be different from dry season to rainy season.

2.1.2 Recurrent Maintenance

This type of maintenance is required at varying interval during the year with a frequency that depends mostly on traffic intensity, volume, and composition. It is conducted throughout the year to repair minor damages resulting from the traffic and rainfall to bring the roads back to their proper condition. The treatment under recurrent involves cracks and potholes patchwork, road edges and shoulders repairment, sealing of cracks, spot gravelling and repairs of structures.

Norms for recurrent maintenance is adopted by the division for this activity. This type of maintenance is generally carried out through contractors. Recurrent norms are still being evaluated and many engineers are clamoring for the revision based on the variation of Recurrent Maintenance activities required based on traffic volume. They also argue that the efficiency of the contractors is questionable and tend to ignore the cyclic nature of the recurrence of maintenance work, thus argues that the work should be left within the jurisdiction of the Division (Mulmi, 2016).

2.1.3 Specific Maintenance

This treatment is a need-based maintenance activity. The maintenance activity can be preventative, preservative or curative in nature. It refers to all the spot improvements and repairs that may not occur every year or in every road, and which are specific in nature and location. This involves localized repairs and improvements to ensure the functionality of all road elements remain uncompromised. Specific maintenance can also be referred as backlog maintenance which is resulted from unaddressed periodic maintenance or small-scale rehabilitation or resealing work that may address emergency conditions.

Based on available budget, a prioritized list of works or activities are made by the divisions. The activities are prioritized by modifying the ARMP submitted to the Maintenance Branch, DoR.

2.1.4 Periodic Maintenance

This type of maintenance works is carried out in intervals of years, that are usually of large scale, and are aimed at preservation of functional performance of road. It is cyclic in nature and the cycle of maintenance is justified by the economic return of the intervention. The objective of the maintenance is to rejuvenate the road surface and carry out repairs over long stretches of road. On paved surface, resealing, surface dressing, overlay etc. are the major activities performed in periodic maintenance, while re-gravelling and correction of road geometry are performed on unpaved gravel roads.

This type of work is done through the contractor. In November 2005, Standard Procedure for Periodic Maintenance Planning Policy Document was approved by the Ministry. This procedure of planning needs to be adjusted for economic analysis in

the coming years, in order to reflect the economic justification for investment (Maintenance Branch, DoR, 2018/19).

2.1.5 Emergency Maintenance

The responsive maintenance activities carried out due to expected and accounted but uncalculated abrupt blockage of roads that hinders vehicular movement caused due to natural disasters like flooding, landslide or earthquake is referred as Emergency Maintenance. The nature of the maintenance activity may be functional or structural reinstatement of road. The aim of the maintenance is to quickly reopen the road, protect it from further damage and resume vehicular flow in the road. It includes removal of debris, landslides and other obstacles, placement of warning signs, diversion works and structural reinstatement of roads. Emergency maintenance requires timely assessment of damages, reporting it to higher authorities, sending the "road closure forms" to the department and management of machines and equipment for the timely response of the maintenance activities. The Emergency Maintenance works that need immediate attention, the DROs use funds from other activities to cater the need and later apply to the RBN for reimbursement(Maintenance Branch, DoR, 2018/19).

There are several potential locations along the strategic road network, which are highly vulnerable to road closure during monsoon and other natural calamities. In order to minimize the risk and the duration of road closure, DoR prepares an emergency action plan every year and deploys necessary heavy equipment, manpower and construction materials in all potential and pre-identified locations (Maintenance Branch, DoR, 2018/19).

2.1.6 Rehabilitation

This is not considered as a maintenance work. When the road condition becomes poor or defective, rehabilitation work is needed to restore the road to required level of service. This curative form of maintenance aims to fulfill functional as well as structural performance of the road. This correctional maintenance activity renews the road considering the design cycle of road. Mostly, the Rehabilitation works are mostly addressed directly by DoR and MoPIT through MoF.

2.2 Road Maintenance Planning Procedure

The maintenance activities are planned at Divisional Level using Annual Road Maintenance Plan (ARMP), formerly known as Yearly Plan of Operations (YPO). Funding for road maintenance is very different from capital investment projects, since, maintenance requires steady and stable funding(Maintenance Branch, DoR, 2018/19).

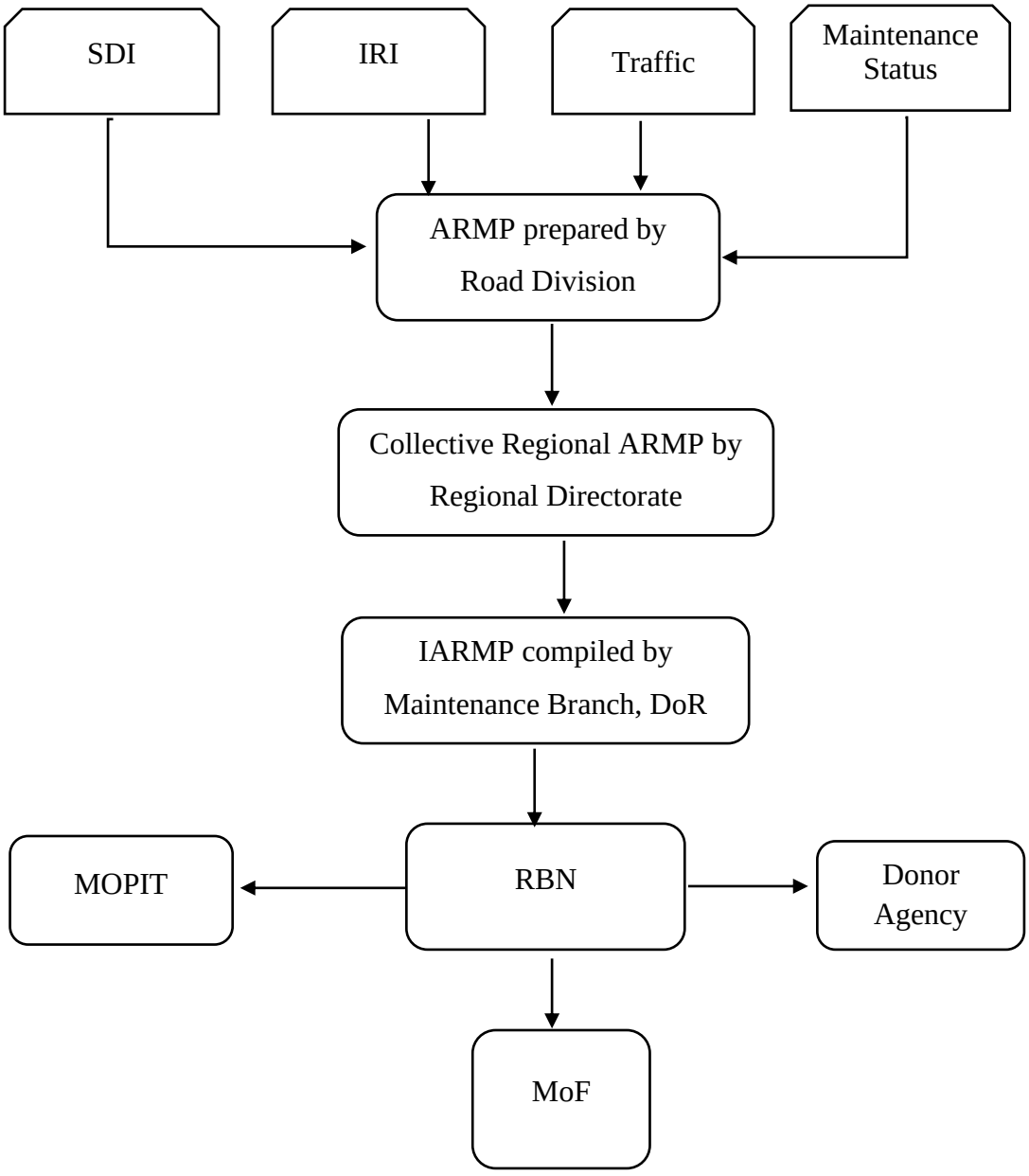

Figure 2-1 Flowchart of Maintenance Plan

First, the pavement condition is assessed in the form of SDI and IRI and figure out the need of the pavement maintenance requirement. The SDI values from 0 to 1.7 is considered good and pavement with SDI values 1.8 to 3.0 is considered fair while SDI values in between 3.0 and 5.0 are considered Poor.(MRCU, 1995). Similarly, Highway Management Information System (HMIS) has categorized the road with IRI less than 2 as excellent, 2 to 4 as good, 4 to 6 as fair and 6 to 8 as poor while the roads with IRI values greater than 8 is considered Bad. The data are uploaded on the Data Sheet of ARMP along with the traffic volume and last maintenance activity conducted on the road link. After the ARMP has been prepared by the Divisions, which is normally prepared in March/April, the divisional document is forwarded to the concerned Regional Directorate for preparation of the Regional ARMP, where in the Regional Management prioritizes on its overall program and establishes its regional budget requirement before forwarding to the DoR Central Management. All ARMPs are combined to form the National Integrated DoR ARMP called Integrated Annual Road Maintenance Plan (IARMP). The DoR Central Management also prioritizes on its overall program based on the maintenance policy and the available budget before submission to the relevant funding agencies, such as RBN (section 2.4).The IARMP is then revised by the RBN based on the available budget, received from toll and the Government. The details are then forwarded to the Maintenance Branch and its divisions. Based on the available budget, the Divisions prepare maintenance contract governed by Public Procurement Act. The flowchart of the maintenance plan has been shown in Figure 2-1. The approved contract amount is released by the RBN after the contract has been fulfilled(Maintenance Branch, DoR, 2018/19). A comprehensive detail of budgetary process of road maintenance system in Nepal is presented in section 2.3.

2.2.1 Annual Road Maintenance Plan

The main purpose of an ARMP is to compile and justify the budget allocation in a transparent and logical manner with norms defined by the DoR. It also serves as a monitoring and evaluation tools. It provides inter-linkage between Divisions and Central Management through Regions with clear roles between them in the process. It basically covers budget estimation process for routine, recurrent, specific, periodic, and emergency maintenance, including routine and recurrent maintenance for bridges. It significantly gives indication of needs for rehabilitation, upgrading, reconstruction

and other intervention works. Besides, it also covers the issues of equipment and tools and other logistic facilities required within a division. Also, ARMP forms the database which can be referred by higher authorities for planning of maintenance intervention and fund management.

2.3 Budgetary Process of Maintenance System in Nepal

The budgetary process of maintenance system in Nepal is illustrated in the Figure 2-2. Currently four methods of taxation are in practice to generate revenue for the maintenance of road. The process of collection and their drawbacks are explained in the section 2.7. Out of them, only toll charges are under the direct control of RBN.

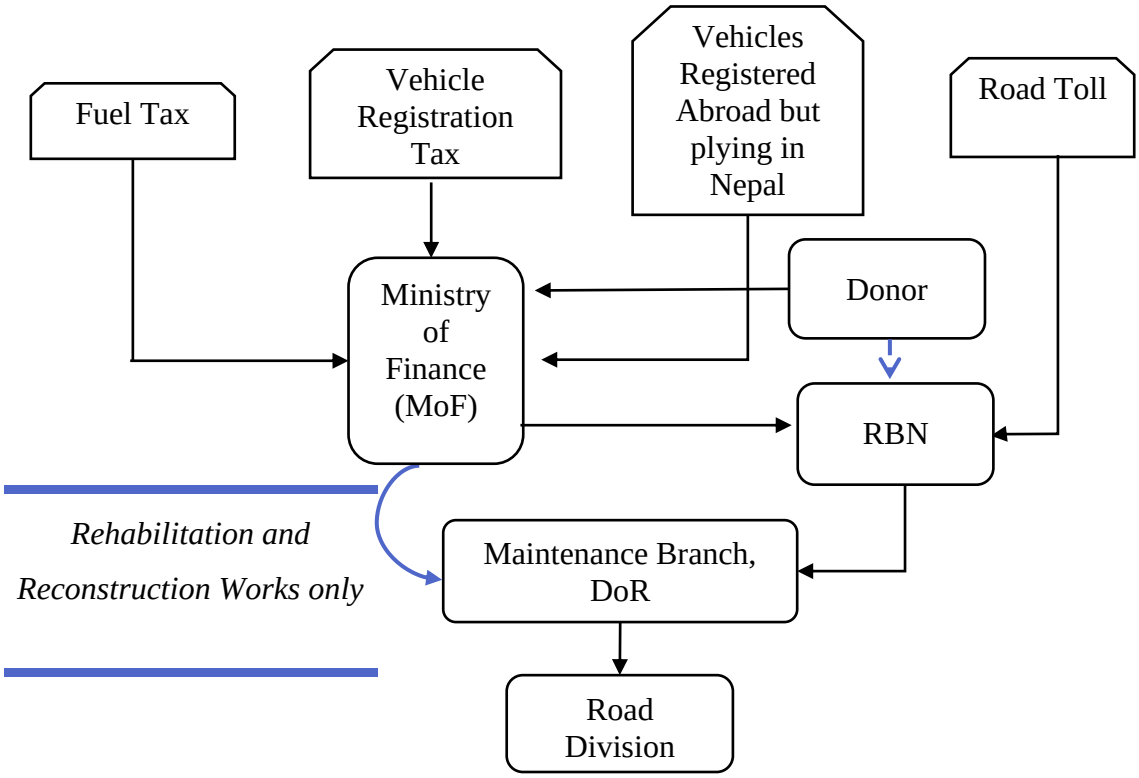

Figure 2-2 Current Budgetary Process of Maintenance

According to the Road Board Act 2058, the donor agencies are supposed to coordinate with RBN for maintenance projects in Nepal, however donor agencies and MoF makes a Memorandum of Understanding among them and executes the project. The MoF provides some of the collected tax to the RBN. The RBN then based upon the available budget revises the IARMP prepared by Maintenance Branch and forwards it to them. Based on the budget available to Road Division, they prepare

maintenance contract. The approved contracts sums are then disbursed by the RBN to Road Divisions through Maintenance Branch.

2.4 Road Board Nepal

Under Road Board Act 2058, RBN was established as a self-governing, self-sustaining, and organized entity based on PPP model with the sole purpose of keeping the roads functional. The policies based on short term, medium term, and long term for different types of maintenance works and importance of road network/link are in effect. The priority is given to central level transport infrastructure with due attention to environmental concerns, safety, and appropriate institutional arrangement, while local network is to gradually be handed over to local bodies. All the non-maintainable roads are opted out of priority list as they have to be brought to maintainable condition through rehabilitation or reconstruction.

RBN works together with different Road Agencies (RA), out of which Department of Roads (DoR) is responsible for the Strategic Road Network (SRN). Division offices, DRO submits Annual Road Maintenance Plan (ARMP) and budget required to carry-out the plan. The Maintenance Branch of DoR then prepare Integrated Annual Road Maintenance Plan (IARMP) on the basis of ARMP submitted by different DROs and presents it to the RBN. Based on the IARMP, RBN disburse a share of the acquired budget (allotted from MoF) to the Maintenance Branch. The Maintenance Branch of DoR is then responsible for distribution of the received fund to all of its 34 DROs. The DoR assesses the road condition (as IRI and SDI) to make ARMP and submit the report to RBN requesting the budget required to carry out the maintenance works.

The RBN then collects such reports from different road agencies and prepares IARMP and submits it to MoF, based on which the ministry allots board its fund. The granted sum never meets the required fund, which is about one-fifth of the collected toll.

The board currently is now fully funding routine and recurrent maintenance, and partly the periodic maintenance, along with specific, emergency, and minor works which are urgently required for keeping the road open. The available road fund is still deficient to address the SRN road maintenance need.

2.5 Maintenance Methods/Contracts Practiced in Nepal

Two special methods of maintenance contracts have been implemented in Nepal, viz. Strengthening Maintenance Division Contract and Performance Based Maintenance Contract. The details are explained in the following subsections.

2.5.1 Strengthening Maintenance Division Contract

A two-year pilot project in two Road Divisions in 1993 marks the initiation of Strengthened Maintenance Divisions Program (SMDP) after the successful trial on Lamosungu-Jiri Road. With the aim of developing a maintenance management system suitable for the maintenance of SRN in a planned way, Phase I started in 1995. In the Phase II (1998-2002), SMD Process was gradually expanded and covered 23 Maintenance Divisions. The phase III, starting right after the completion of Phase II in 2002 and ending in 2006, incorporated two remaining Divisions achieving ability to prepare ARMP by all 25 Division Road Offices (DROs) along with rational financial management in terms of budget heads and funding.

The SMDP road maintenance management is based on planned maintenance system. Allocation of the annual divisional maintenance budget is mainly carried out based on ARMP. ARMP process is explained in the section 2.2.1 above.

All the Maintenance activities defined in the SMDP process (see Figure 2-3) are conducted on short-term schedule item rate contract, where contract perform the work as per the Bill of Quantities. After completion of the work, contractor gets the work completion certificate and payments are made to the contractor. There is not any proper mechanism to monitor the work of the contractor or make them liable for the quality of the works afterward. The results in many cases were less than satisfactory. The problem is that the contractor has the wrong incentive which is to carry the maximum amount of works in order to maximize his profit. Under this modality, a lot of work is carried out and much money spent, but the overall service quality for the road users depends on the quality of the design given to the contractor who is not accountable for it. In the entire maintenance contract under SMDP, DoR Engineers are directly involved from procurement to the implementation. There is no consultant outsource for the supervision of the construction work under this maintenance contract.

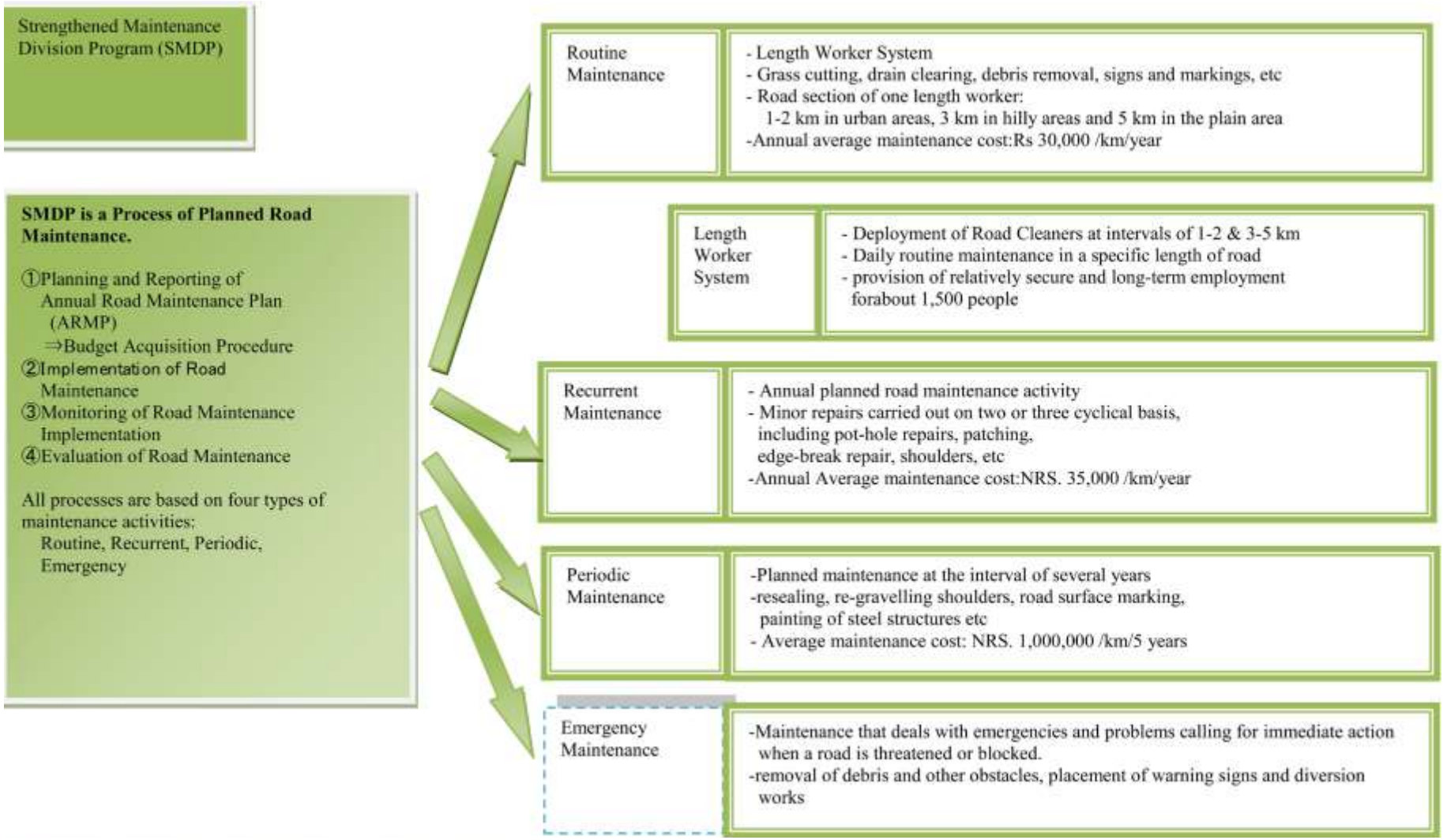

Figure 2-3 SMDC Process [Source: (Mulmi, 2016)]

2.5.2 Performance Based Maintenance Contract

The first pilot-based Performance Based Maintenance Contract started in June 2003 under the Road Maintenance and Development Program (RMDP) supported by IDA (International Development Association) in June2003. The duration of the contract is only 2 years. 3 Contracts under RMDP/IDA and 5 Contracts under Road Network Development Program (RNDP) supported by Asian Development Bank (ADB) were implemented in Nepal as Performance Based Maintenance Contract. The Performance based management and maintenance contracts in Nepal generally comprises of General

works, Maintenance works, Improvement works, Emergency woks, Day works Out of the above works, Improvement works are planned to be completed in first two years while maintenance works planned in final three years of the project. Performance Based Maintenance Contract in Nepal allows the bidders to compete for a fixed monthly lump sum fee per km of road for the maintenance of the road. The Contractors are not paid directly for the inputs but are paid for the output like the initial rehabilitation works to the predefined standards. The monthly lump sum remuneration paid to the contractor cover all physical and nonphysical maintenance service provided by the contractor except for the unforeseen emergency works which are remunerated separately. Improvement works are rehabilitation works which have been explicitly specified by the employer in the contract would be quoted based on the measurable output quantities and paid as performed. In order to be entailed to the monthly payment for the maintenance services, the contractor must ensure that the roads under contract comply with the service quality levels which have been specified in the bidding document. The Contract modality hence is not completely output based as the Bill of quantities on all above contracts contain the item of works and the contractor quote the rate for each item to compete for the bid. The only variance of PBM model in Nepal from the traditional contract, is that it specified the minimum service quality level as the desired outcome for payment in the maintenance part. The Performance Based Maintenance Contract modality in Nepal and its characteristics is shown in Figure 2-4 The DoR directly supervise the PBMCs in the same way as in SMDP maintenance contract. The theory behind the PBMC is best understood with the Figure 2-5 where the difference between normal construction-reconstruction cycle and PBMC is plotted against each other.

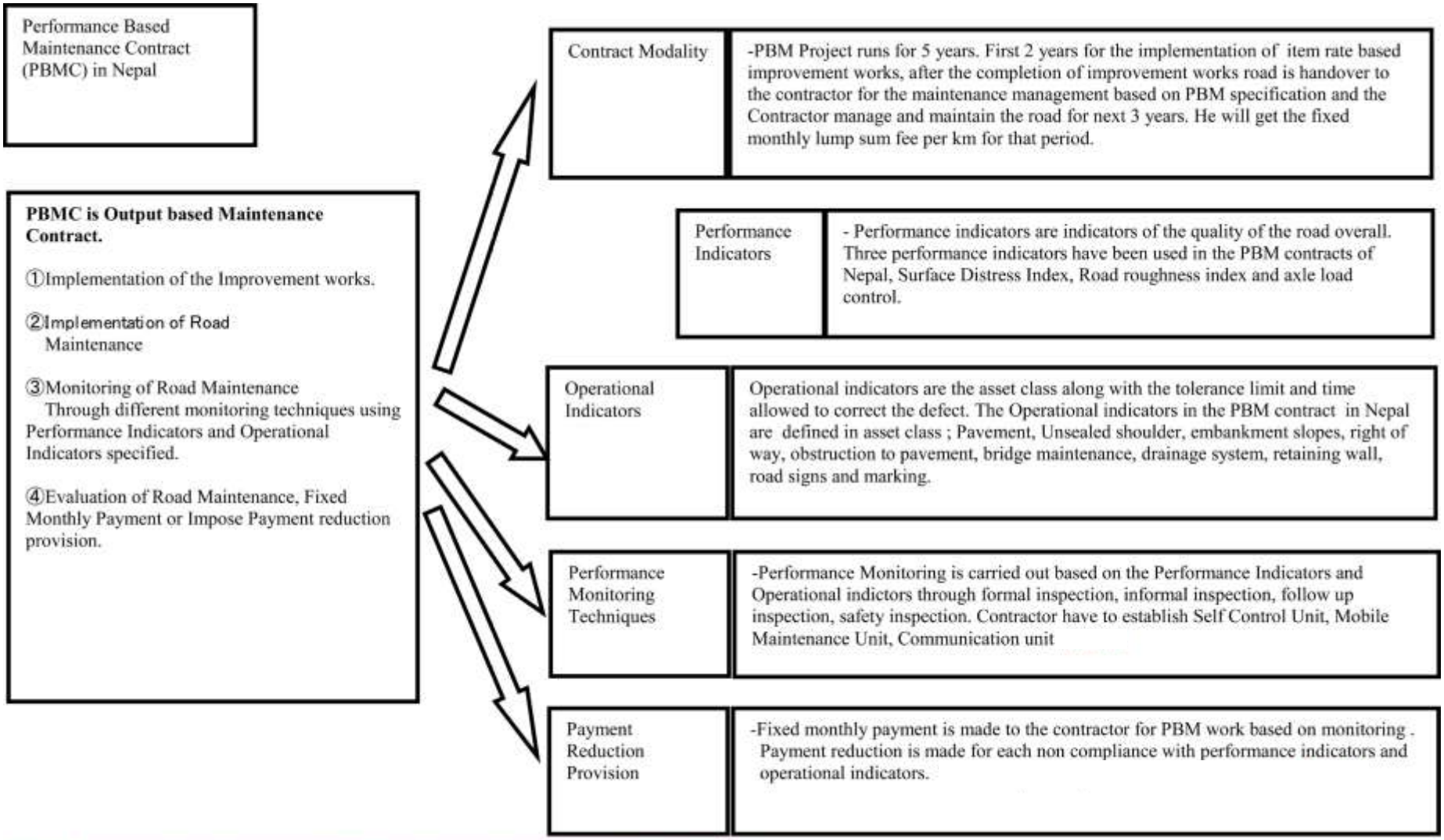

Figure 2-4 PBMC Process [Source: (Mulmi, 2016)]

The basic idea involved in the PBMC contract is that a predefined standard (as stated in the contract) of performance is maintained throughout the contractual period. The road asset is maintained at the performance level by the contractors through different activities as shown in the Figure 2-6. The works involved are general works, maintenance works, improvement works, emergency works and dayworks.

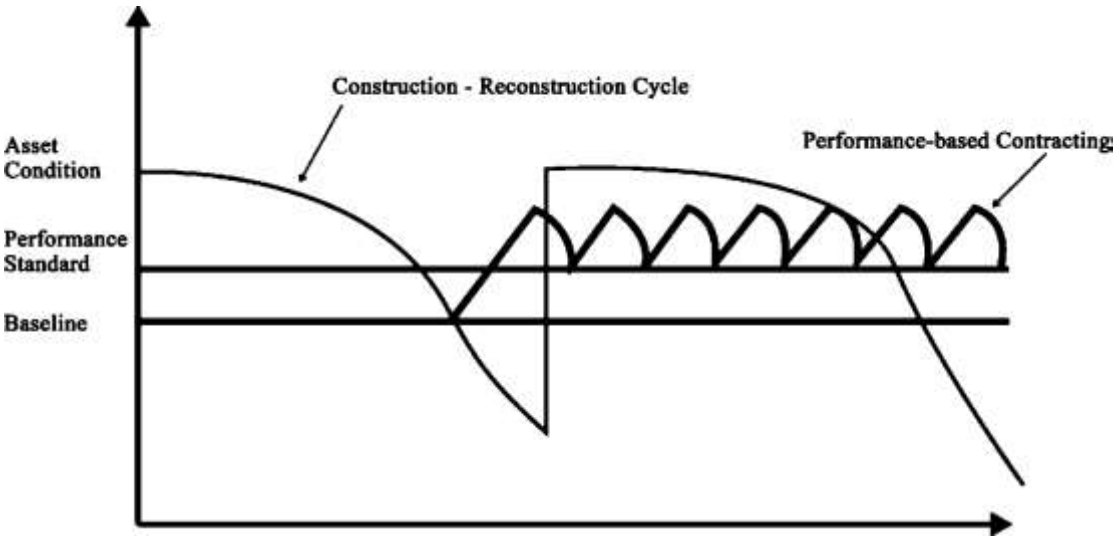

Figure 2-5 Road Asset Condition under traditional and PBMC

[Source: (Mulmi, 2016)]

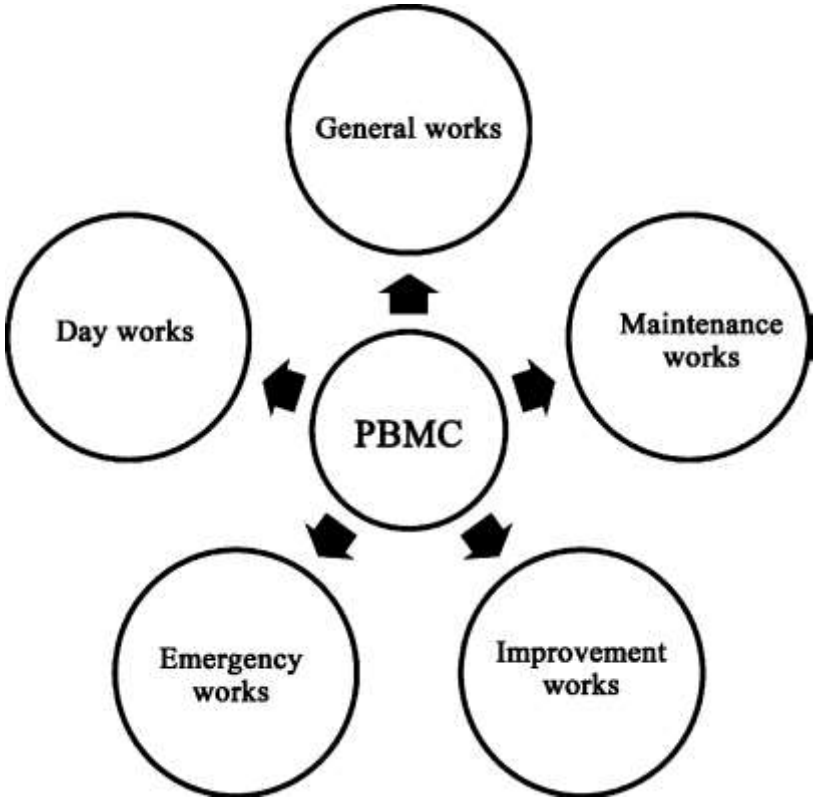

Figure 2-6 Different Works Under PBMC [Source: (Mulmi, 2016)]

2.6 International Practice in Road Financing

In order to find the sustainable solution to finance and prevent degrading roads in Sub-Saharan Africa, United Nations Economic Commission for Africa and World Bank in conjunction with a number of bilateral agencies launched Road Maintenance Initiative and deduced that *commercialization of road* is the best bet (Heggie, 1995). Typically, privately funded road projects are in a smaller percentage of the total network. However, Latin American countries have 53% of privately funded highway investment. China, Indonesia, Mexico and Malaysia are other developing economies with significant private investment in transport.(World Bank, 2000)

It has been expected that many countries will be looking to modern road user charging systems that would generate more funds for maintenance and expansion of road networks, that can either purely be a public projects or some form of PPP arrangement.(Queiroz & Izaguirre, 2009). Most of the European countries like UK, Spain, Italy, and France have already taken advantage of the private financing, while Asian countries like China, India and South Korea have been able to attract substantial private investors to finance road (Queiroz, et al., December 2016).The PPP programs are deemed quite innovative tool to finance road maintenance, however public entity must exact experiences from other jurisdictions to develop a robust and evidence-based plan for successful partnership(Alexopoulos & Wyrowski, 2017). Many types of PPPs are practiced all over the countries.

2.6.1 PPP Concessional Funding

Many institutes and organizations have given different definition for PPP, but a basic yet comprehensive definition for PPP as defined by Government Accountability Office is “a contractual arrangement that is formed between public and private-sector partners. These arrangements typically involve a government agency contracting with a private partner to renovate, construct, operate, maintain, and/or manage a facilities or system, in whole or in part, that provides a public service. Under these arrangements, the agency may retain ownership of the public facility or system, but the private party generally invests its own capital to design and develop the properties. Typically, each partner shares in income resulting from the partnership. Such a venture, although a contractual arrangement, differs from typical service contracting in that the private-sector partner usually makes a substantial cash, at-risk, equity

investment in the project, and the public sector gains access to new revenue or service delivery capacity without having to pay the private-sector partner." The basic structure of a design-build-finance-operate-maintain (DBFOM) concession is illustrated in the Figure 2-7.

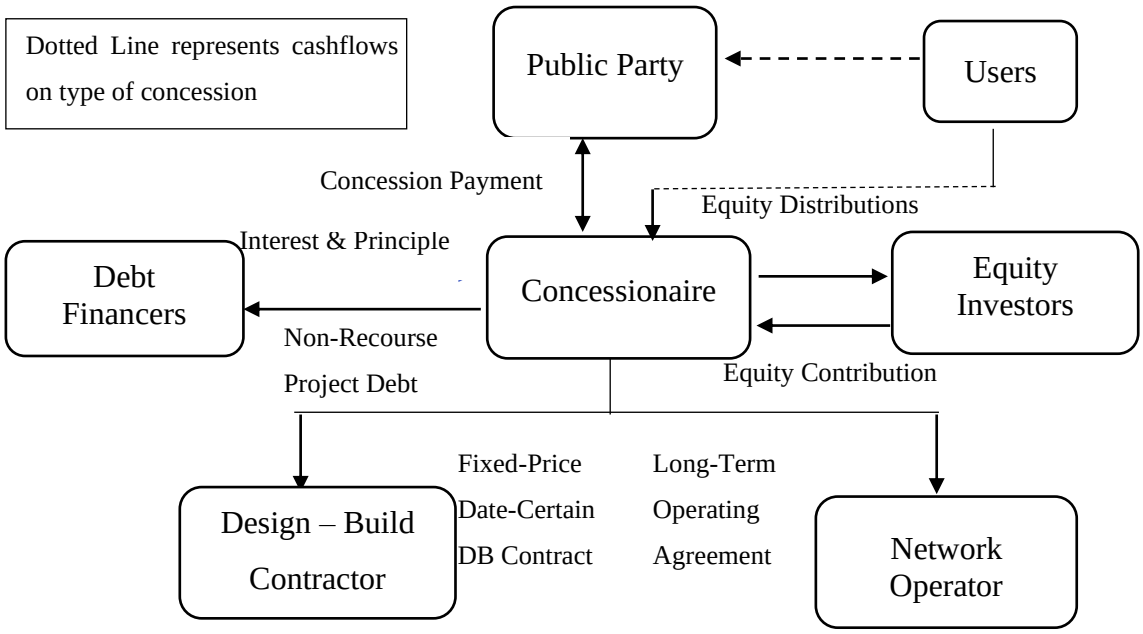

Figure 2-7 Typical Concession Structure

Source: (Poole, 2017)

In the two types of concessions portrayed in Figure 2-7, various contractual relationships and flows of funds among the parties are highlighted. Contractual agreement called the concession agreement binds the two central parties: the public party (Government Entity) and the private party (Concessionaire). The agreement defines the rights and responsibilities of each party, including but not limited to performance standard and payment mechanisms. The two types of DBFOM concessions are explained in the following section below.

Revenue-Risk (RR) Concession

The RR concession is the PPP arrangement where the private partner is ready to accept the risk that its capital investment and operation cost as well as the profit can be abundantly generated from revenue collected. One-time payment will be made by the government and cannot be counted on for repayment of debt or equity under this

model. The toll-financed projects are referred as RR concessions where the service users directly pays the service fee to concessionaire.

Availability Payment (AP) Concession

The AP concession is also a PPP arrangement where the private partners makes a long-term commitment to design, build (or rebuild), finance, operate and maintain the project for the agreed life in reciprocity for fixed annual amount, contingent on satisfactory delivery of the facility and meeting the functional standard set by the public entity. The private partner takes on the risks of construction cost overruns, timely completion, and operation and performance standards throughout the agreed period of time, while the public party takes responsibility for funding and collecting annual payments to the concession party. This type of concession best fits where tolling is not permitted, and the public party is unable to bear the cost upfront. In this case the service fees are collected by the government entity in terms of direct road use tax or other indirect means to pay the concessionaire.

2.6.2 Sources of Road Maintenance Financing

In a country like Nepal with scarce resources, different sectors vie for resource allocation from the government. The budgetary process in Nepal is highly politicized. Capital expenditure and ribbon cutting win more votes than keeping the road in good condition. Even though the benefits enjoyed from a well maintained road is imperceptible to naked eyes, being reflected in different relatively small savings enjoyed by the road users, and taken for granted, the expenditures incurred in maintaining the roads are highly visible being a big budget item, as the typical maintenance costs for roads are about 3% of their construction each year. The economy involved with the road maintenance business is widely vast and does not have to stay as a government responsibility based on the societal benefit. Two or more of the following parties can be brought together in PPP contract to keep roads functional all the time.

Government Entity

It means any federal, provincial, local or similar government, and any body, board, department, commission, court, tribunal, authority, agency or other instrumentality of any such government or otherwise exercising any executive, legislative, judicial, administrative or regulatory functions of such government. Government of Nepal has

been responsible for the collection of tax in the various facets (fuel levy, vehicle registration tax etc.) distribute it to the Agencies that work for or with the government like DoR and RBN.

Semi-Government Entity

A semi-government is an institution that is both public and private, combining the elements of government bureaucracy with a private entrepreneurship. RBN is a semi-government entity that is dedicated to keep the road asset of Nepal functional all the time. RBN oversees the planning, programming, budgeting, operating, monitoring and evaluation of the road maintenance of Nepal. The entity also makes suggestions on the fixation and amendments on toll rates and fuel levy to be collected.

Multi-Lateral Agency

Multilateral Agencies are the international community mobilizing the resources for investment, and garner the better socio-economic impacts from the investment, locally or globally. Multilateral Development Banks (MDBs), part of the international institutions plays a pivotal role in providing financial and technical assistance in the forms of loans and grants to the projects in developing countries, for a bigger positive impact on the socio-economic development of the nation(Broccolini, et al., 2019). MDBs provide direct support to member nations by direct mobilization of the private sectors who are reluctant to invest in projects and can indirectly mobilize private finance indicating the profitability of projects allocating their own money (Gurara, et al., 2020).World Bank, Asian Development Bank etc. are the prominent MDBs involved in the road maintenance activities in Nepal.

Bilateral Agency

Bilateral Financial Institution (BFIs) is a government agency or nonprofit organization set by one individual country that receives funding from its home country's government to be used for financial assistance to the developing nation. DEG (German Development Finance Institution), Japan Bank for International Cooperation (JBIC) United States Agency for International Development (USAID), etc. are the example of the (BFIs). Funds are more specifically targeted compared to multilateral aid. Millennium Challenge Corporation (MCC) is one of the BFIs granting 500 million dollars to improve Nepal's energy and road infrastructure, out of which $52.2 million is slated to be invested in the Road Maintenance Projects of

around 305 km of SRN and prevent further deterioration of Nepal's road network (mmc.gov, n.d.).

Private Sectors

It encompasses all for-profit business that is the part of the national economy but is not under the direct control of state and is run by individuals and companies for their gains. They are owned, controlled, and managed by private individuals or enterprises. Companies and corporations that are government run are part of what is known as public sector. Sometimes public and private sectors work together while promoting common interests or while the work is beneficial for both parties. The conjugation is called Public-Private Partnership. The road related bodies of Nepal can use this partnership to generate the deficient fund to holistically carryout the maintenance work that is in dire strait.

2.7 Instruments of Road Maintenance Financing

There is great deal of instruments the Government, public institutions like RBN, or any corporate entity may use to finance the maintenance expenditure. Road transport doesn't just include the cost of construction and maintenance of the road network, but it also includes road user costs, which is inversely proportional to the road condition when added to the VOC (vehicle maintenance and fuel consumption). The costs incorporated with increased time in travel and transit, as well as the costs associated with road accidents amounts to about 1% to 3% of the gross domestic product – GDP, as estimated by the Global Road Safety Facility (World Bank, 2014). Therefore, it is in the best interest of the road users to have well maintained roads. They can pay through tolling directly, or indirectly through other taxes like fuel tax, vehicle registration tax etc. The experiences illustrated by the Queiroz et all has depicted that the road users are willing to pay for road maintenance if the fee for the services used has improved the road condition. The principles of road using taxation should be economically efficient, equitable, unavoidable, and collectable easily without costing much. Inflation should also be considered and adjusted accordingly(Queiroz, et al., December 2016). The instruments to finance road maintenance has been described below:

2.7.1 Tolls

Tolled roads with restricted access, where the funds are retained by the road operator, for the benefits of restricted access, or debt payments, or returns on investment, generally roads are sufficiently maintained (ADB, 2013). However, they have relatively high capital costs and a general rule of thumb dictates that the traffic on the tolled road should at least be 5,000 vehicles per day, to keep the administrative costs at a relatively low percentage of the toll revenues (Queiroz, et al., December 2016). Around 4500 km roads of SRN are plied with more than 5000 vehicles, out of which 321 km of roads are currently tolled and 753 km of roads in total are proposed to be tolled.

2.7.2 Taxes on vehicle Fuel

Fuel taxes are easy and inexpensive to collect and administer, and to some extent they are proportionate to road use, hence, equitable. The problem with this taxation system is that they do not necessarily reflect the equitable damage imposed by heavy vehicles even though fuel consumption of trucks is higher than that of cars. Therefore, such vehicles with higher pavement damage per kilometer should be supplemented with additional charges like higher vehicle registration fees.

Fuel taxes are also developing nations one of the methods to raise revenues for general budget. Nevertheless, enough funds should be allocated to carry out an appropriate level of road maintenance and expansion if no separate charges are collected by the Road Maintenance bodies.

2.7.3 Vehicle Licenses

They are common in most countries as they are easy to collect and can be differentiated with respect to distinct types of vehicles and the damage they cause to the pavement. However, the drawback with this method of taxation is that they are not relatable to their usage or direct involvement in the pavement damage. A truck licensee driving for 500 km a year will pay the same fee as the licensee driving 10,000 km a year.

2.7.4 Vehicle Registration Charges

Government of Nepal has been collecting taxes from the vehicle owners from the beginning of establishment of RBN. They are relatively easy to collect along with the

license issuance and renewal taxes. The taxes are collected based on the type of vehicles they own and the level of impacts they make on the road; however, they do not implicate the vehicle use and the actual damage caused to the pavement.

The four above mentioned methods of Road User Charges are currently in practice in Nepal.

2.7.5 Vignette

They are used in several European countries as a road user cost in the form of a small, coloured sticker that is affixed to a vehicle windshield. Hungary and Romania use electronic method of vignette(Queiroz, et al., December 2016). They are typically collected for the vehicles plying on the highways and expressways as a permit. They are usually sold for a fixed period of time, irrespective of the distance travelled.

2.7.6 Vehicle-distance Travelled Charges

This type of taxation in conjunction with tolls are called “direct user fees”. The charges are administered through sealed hub odometers or other measuring devices. Such system requires a substantial initial outlay and sophisticated administrative process. Several developed countries like USA, Norway, Sweden, New Zealand etc. have implemented this method. They are also very prone to evasion. Even law-abiding nation like New Zealand estimates the evasion to be 10 to 20 percent. A few of the shortcomings can be avoided with more technologically advanced system, such as the ones used in Germany and Austria(Queiroz, et al., December 2016).

2.7.7 Charges for non-standard and overweight vehicles

The basic principle governing this taxation method is that these charges should sufficiently compensate for the extra damage caused to the roads by overweighed and oversized vehicles. These charges seldom reflect the costs imposed on the roads and the hassle it has to go through barely covers administrative expenses(Queiroz, et al., December 2016). They tend to be easily avoided through bribery and corruption. It would be better to cover the damage due to overloading through axle load limitations by stricter enforcement (e.g. Fines and forced unloading of contravening trucks).

2.7.8 Sales Tax

The sales tax of the new vehicles and spare parts are collected by the Government. The transparency of the fund provided to RBN from the collection of these taxes are

questionable, but part of these taxes is funded for the road infrastructure in several countries including Nepal.

2.7.9 Land Value Capture

It refers to different measures that the public sector may use in order to create or "capture" the additional value and/or externalities generated from public sector investments in public goods. For instance, development of transport infrastructure is likely to add value to adjacent land and real estate and some percentage of this additional value can be used to fund the construction. Hongkong Mass Transit Railway is one of the best-known projects that used land value capture mechanisms to pay for itself. (United Nations, 2013)

2.7.10 Congestion Charges

Congestion pricing is an excellent way to address traffic congestion and maintain level of services in the urban roads. Developed countries like UK, USA, France, Norway, Germany, Sweden, Singapore, Australia, and Switzerland have provided valuable lessons for those interested in exploring the additional means to maintain and expand road networks. The drawbacks of the taxation system are that it is expensive to administer, it requires intricate network of alternative roads and are susceptible to evasion.

CHAPTER THREE: RESEARCH METHODOLOGY

Explanatory Sequential Mixed Methods Design procedure is adopted for the research with a strong quantitative background to uncover problems underlying and propose solutions with qualitative approach. The research design involves two-phase of data collection, analysis, and consecutions. In the first phase of the research, rigorous quantitative sampling has been conducted, processed, and analyzed for the results, which then is used to plan the second phase of the research. The second phase of the approach is to collect qualitative data from emerging trends of successful practices from literature review and experts' opinions to accomplish objective of the research.

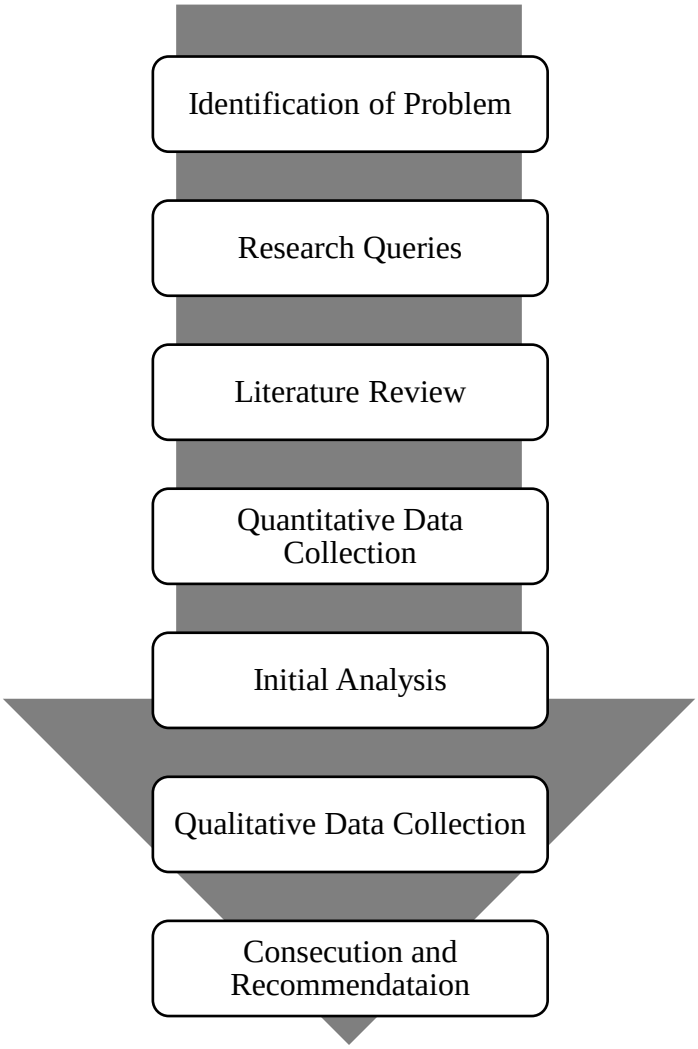

Figure 3-1 Research Design

The research design outlay is presented in the Figure 3-1.

3.1 Review

The existing and past practices of the maintenance management system of the RA has been reviewed to gain a clearer idea on the maintenance performance. The maintenance policies, journals, researches, and dissertations have been meticulously reviewed.

3.2 Data Collection

3.2.1 Pavement Inventory

i. Surface Distress Index (SDI)
ii. International Roughness Index (IRI)

Pavement condition data sheds light on the severity of the pavement (SDI) and ride comfortability (IRI). The data are collected over the period of years and performance of the maintenance activities are measured and conclusions are derived based on the data analysis. The sampled data has been used to derive the general pavement condition over the period of years and hence assess the impact of financial status of maintenance fund.

3.2.2 IARMP and Revenue Data

i. Budget requirement of holistic maintenance activities of SRN
ii. Budget Allocated to SRN
iii. Road related taxes (fuel, vehicle registration, license, toll etc.)
iv. Fund granted to RBN

These data have been used to exact the budget collection trend from different taxes, budget allocation trend and budget requirement trend. The data have also been used to determine the resource gaps between collected, allocated and required fund and observe the resource gap trend in maintenance fund. The data on road related taxes has been used to determine the share of budget contributed by each tax imposed on the road users.

3.2.3 Expenditure Data

i. Fund Limit set for SRN
ii. Disbursed Fund to Maintenance Branch for SRN

These data will be used to measure the efficiency of RA and contractors. The gap between the allocated and disbursed fund is found out and the expenditure efficiency of the RAs has been determined.

3.3 First Phase Analysis

In the first phase of analysis, the problems with the existing practices of maintenance management system will be identified as shown in the Figure 3-2. The necessity of the road maintenance, cost efficiency of maintenance branch, quality of pavement and maintenance services will be analyzed to make a basis for the second phase of the research.

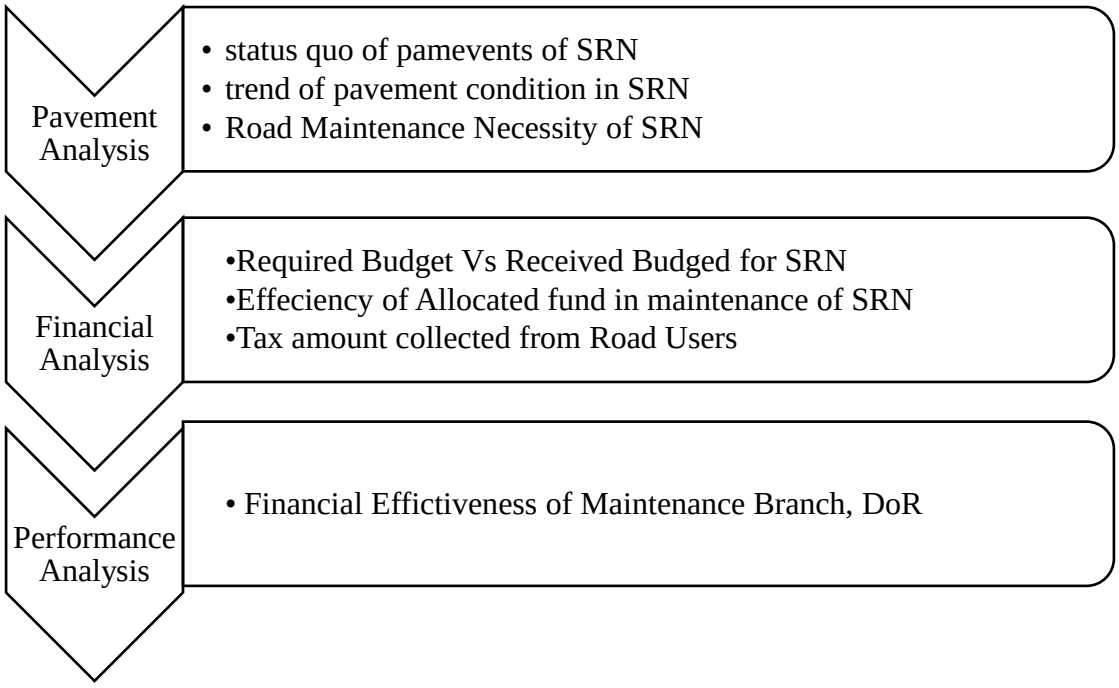

Figure 3-2 Initial Research Design

3.3.1 Pavement Analysis

Overall Pavement Condition has been determined using SDI and IRI (data acquired from HMIS). This result has given the general idea of existing pavement condition and states the necessity of maintenance work. The pavement condition over the years has illustrated the trend of maintenance work and delineates the impact of budget deficit.

3.3.2 Financial Analysis

The IARMP prepared by the Maintenance Branch claims that 20% of the total budget required is allotted to maintenance branch, DOR (Maintenance Branch, DoR, 2018/19). The fund is then distributed to DROs. The tax collection, approved and disbursed funds has been analyzed to illustrate the total budget collected, contribution of the taxation method in road maintenance, required and approved budget, and their trends has been calculated and illustrated. Funds Exhaustion data was collected from RBN in the form of Approved and Disbursed Budget to measure the expenditure efficiency of RBN.

3.3.3 Performance Analysis

Based on the heretofore analyses, performance of the maintenance system has been scrutinized, and the effectiveness of maintenance system and maintenance contract is measured.

This phase of analysis will determine what is wrong with the present maintenance system of Nepal.

3.4 Second Phase of Research

To meet the objective of this research, in the second phase, several literatures has been scrutinized. Suggestions has been made to mitigate the issues determined in the first phase of analyses with the help of literature review of successful practices.

CHAPTER FOUR: RESULTS AND CONSECUTIONS

The objective of the research is to assess the financial status of the road maintenance in SRN of Nepal. Relevant financial data and pavement data has been collected and demonstrated in different forms to exhibit the financial status of road maintenance.

4.1 Assessment of Pavement Condition

The total roads in good condition in terms of SDI is more than 50 % in the beginning of survey. However, the good roads in terms of SDI has dramatically decreased in four years from 2010 to 2014 and has never risen since then. It can also be observed that the poor roads are gradually increasing while fair roads have increased from 2014 to 2016 and has been decreasing ever since. The consecution that can be derived from the Figure 4-1 is that fair road has never been tended to maintenance due to the insufficiency of fund for holistic maintenance and only poor roads are brought up to fair condition. Despite that, the percentage of poor roads are increasing because all the poor roads have also not received the treatment it required.

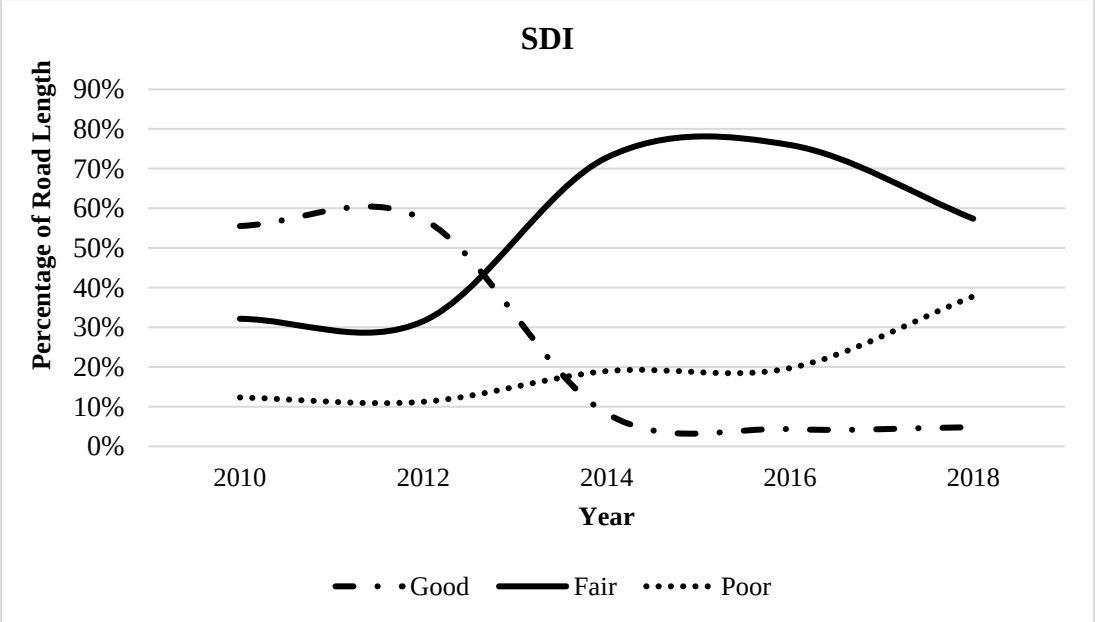

Figure 4-1 Timeline of Surface Distress Index

From the Figure 4-2, it is clear that the percentage of good roads are continuously declining in terms of IRI too. Nevertheless, the quantity of fair and bad roads is inversely proportional to each other. This shows that if maintenance activities are properly carried out, the roads can be brought up to fair and good condition.

However, while preparing ARMP and IARMP, history of the last maintenance activities conducted is also taken into account. For instance, if two roads with equal pavement damage is to fight for the scarce maintenance fund, the road that has not received treatment for longer time is selected for the maintenance. The hard decision had to be made because of the deficiency in monetary resource. This has resulted in the worsening state of fair roads.

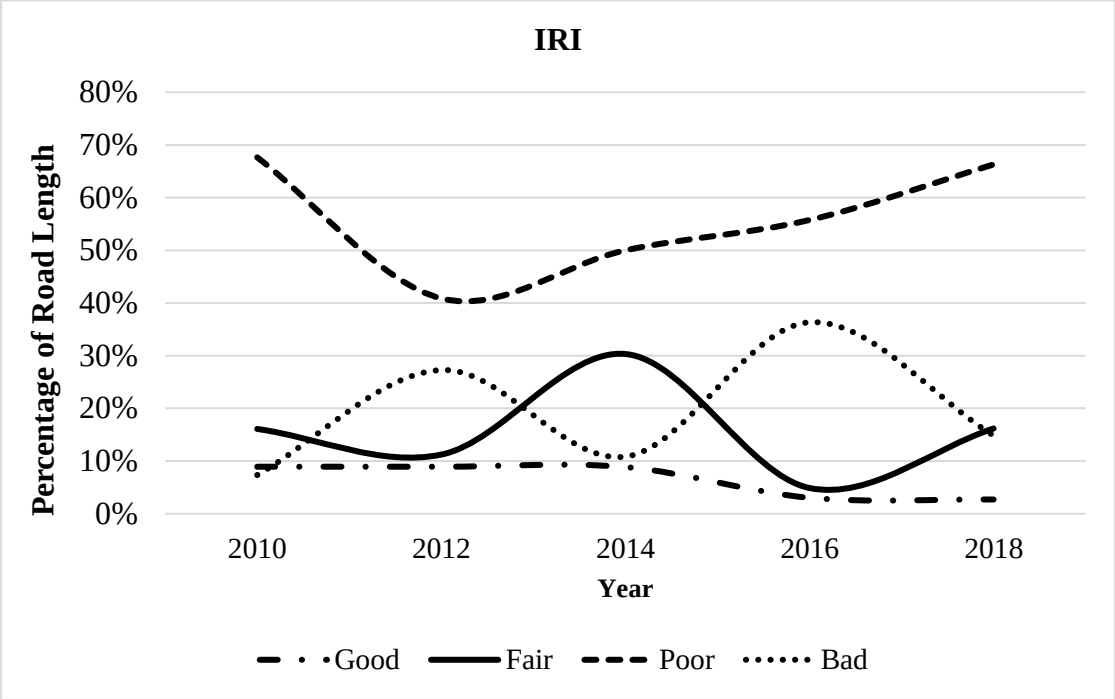

Figure 4-2 Timeline of International Roughness Index

The length of poor roads has declined for a couple of years and since then it has been continuously rising. This indicates that once bad roads are brought up to fair condition, they are being neglected until they drop down to bad condition. The blame can again be put onto the fund insufficiency.

4.2 Assessment of Maintenance Budget

It has already been established that the total road asset of the nation is vastly increasing in Figure 1-1. This means that most of the investments has been made on the new infrastructure and degrading roads has been left to disappear. The increasing volume of road demands for a maintenance budget that is parallel to the Road Asset curve. However, the execution of planned maintenance is very minimal, largely due to funding and contracting constraints network-wide. This has resulted in the reduction of effective life of the road network, further increasing the funding gap and increasing

the management costs. The conundrum has led the road user costs in terms of VOC and extended travel time to increase, and the value of increasing road asset to decrease.

From Figure 4-3, it can be depicted that the need based estimation of maintenance cost is seldom met. The budget need has been exponentially increasing due to the back log of maintenance and increased road asset. However, the approved budget is almost constant over the years as observed in the Figure 4-3. The resource gap is almost parallel to the budget need for most of the time. The implication that can be derived from this is that RBN has not been able to cope with the inflation, neither is it able to find ways to generate more funds.

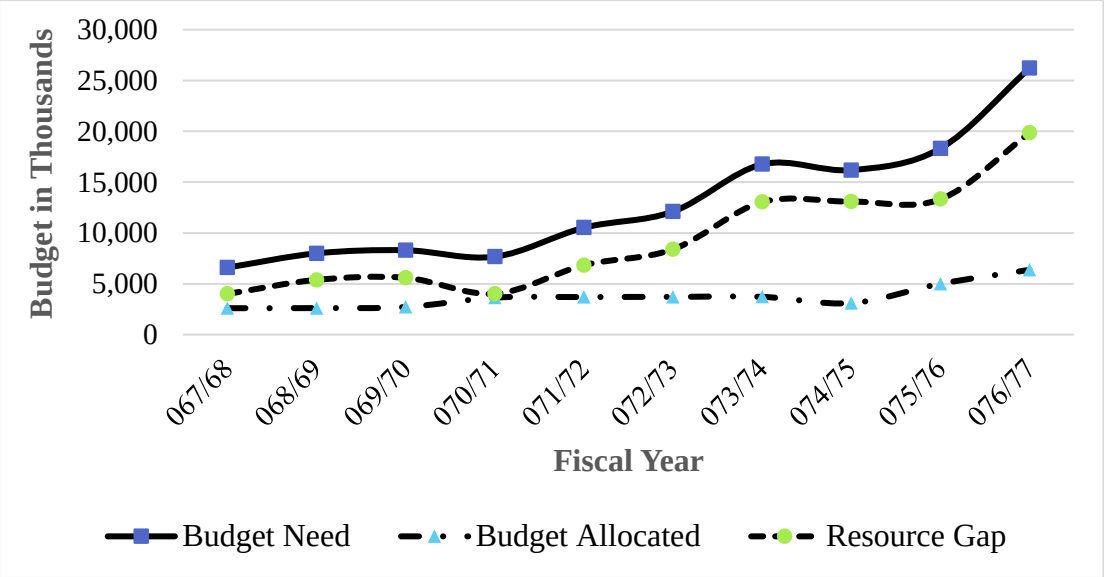

Figure 4-3 Budget Needed Vs Allocated

In the fiscal year 2070/71, the resource gap has dropped because the approved budget was supplemented with the unspent funds of previous years. The trendline of resource gap in Figure 4-4 delineates that if intervention is not made now, the budget gap will continue to grow. A huge sum is required now to recover the hole created by backlog of maintenance. BFIs, MDBs and Private sectors could be used as financers for the purpose.

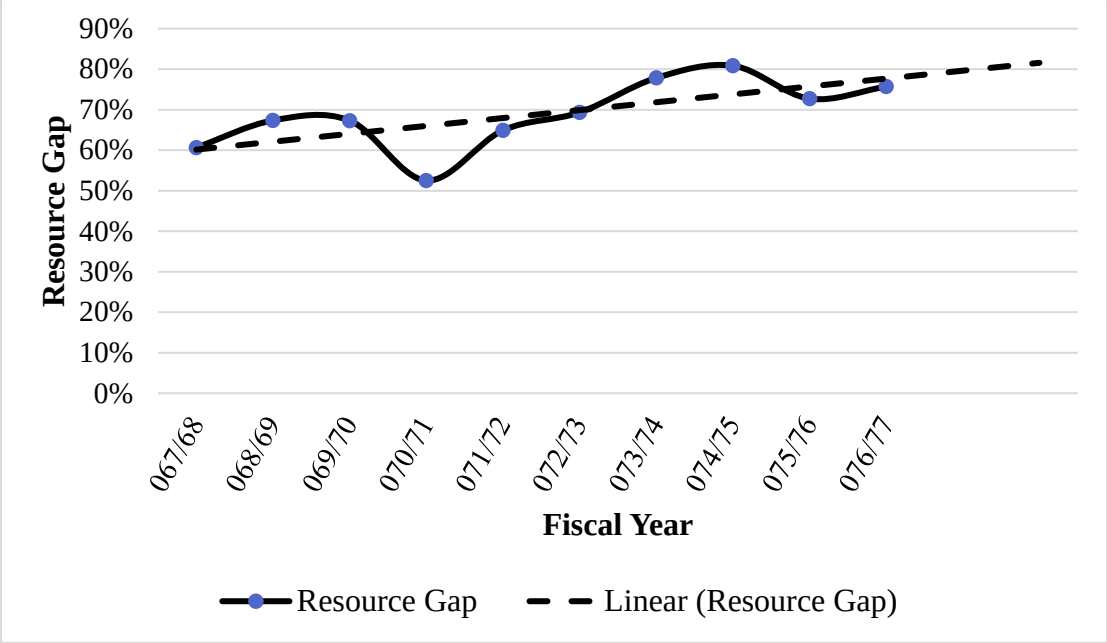

Figure 4-4 Trendline of Budget Gap

4.3 Assessment of Fund Generation for Road Maintenance

It is clearly seen from the Figure 4-5 that vehicle registration and renewal tax has hiked up immensely for a decade now. This implies that number of vehicles plying on the road have increased, leading to accelerated deterioration of roads. When computed from the Table 4-1, the fuel tax as well as toll tax have increased except for 2071/72, the increase compared to vehicle registration and renewal is infinitesimally small. Increase in fuel tax is obvious as the number of vehicles plying in the road has increased, but the increase is not similar. The reason may lie in the fuel efficiency of vehicles. This may cause another problem because the revenue value of the fuel tax will be decreased while the increased vehicles can cause considerable damage to the pavement.

Table 4-1 Fund Generation by Category

Fiscal Year	Collection of Tax as per Road Board Act, 2058, Article 6			
	Vehicle Registration, Renewal etc. Levy	Fuel Levy	Toll	Total
60/61	149,526,039.00	199,138,716.00	42,077,210.00	390,741,965.00
61/62	151,909,117.00	225,825,792.00	43,314,330.00	421,049,239.00

Fiscal Year	Collection of Tax as per Road Board Act, 2058, Article 6			
	Vehicle Registration, Renewal etc. Levy	Fuel Levy	Toll	Total
62/63	168,070,527.00	227,451,000.00	53,792,360.00	449,313,887.00
63/64	250,507,007.00	247,029,015.00	43,711,680.00	541,247,702.00
64/65	444,147,975.00	499,514,000.00	56,772,350.00	1,000,434,325.00
65/66	688,439,206.00	741,108,018.00	64,881,000.00	1,494,428,224.00
66/67	1,458,640,915.00	926,556,000.00	69,671,000.00	2,454,867,915.00
67/68	4,612,145,471.00	1,758,821,360.00	76,737,000.00	6,447,703,831.00
68/69	5,089,462,289.00	2,097,860,200.00	69,763,150.00	7,257,085,639.00
69/70	6,668,249,048.00	2,332,714,900.00	81,786,450.00	9,082,750,398.00
70/71	7,625,457,826.00	2,616,719,400.00	91,951,250.00	10,334,128,476.00
71/72	11,036,814,483.00	2,991,057,740.00	81,347,360.00	14,109,219,583.00
72/73	12,512,837,000.00	2,467,697,940.00	90,865,430.00	15,071,400,370.00
73/74	17,328,609,000.00	2,950,000,000.00	95,363,920.00	20,373,972,920.00
74/75	21,884,774,700.00	3,955,603,000.00	107,405,640.00	25,947,783,340.00
75/76			157,708,100.00	157,708,100.00

It can be said that the toll collection and the contribution made by the toll has always been negligible compared to other sources, and the contribution is further dropping. The details of the relative contribution is illustrated in Figure 4-6. Recently the toll rates have been revised. The total contribution is bound to increase; however, the relative contribution is yet to be seen.

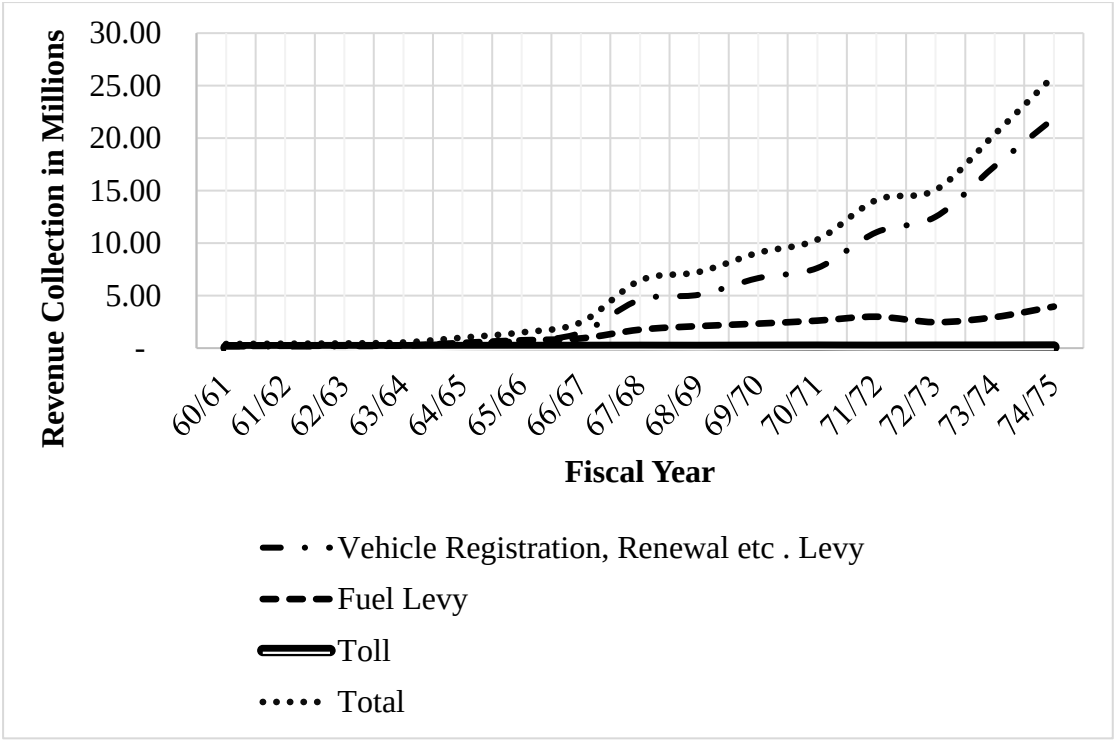

Figure 4-5 Contribution of Revenue by Different Facets

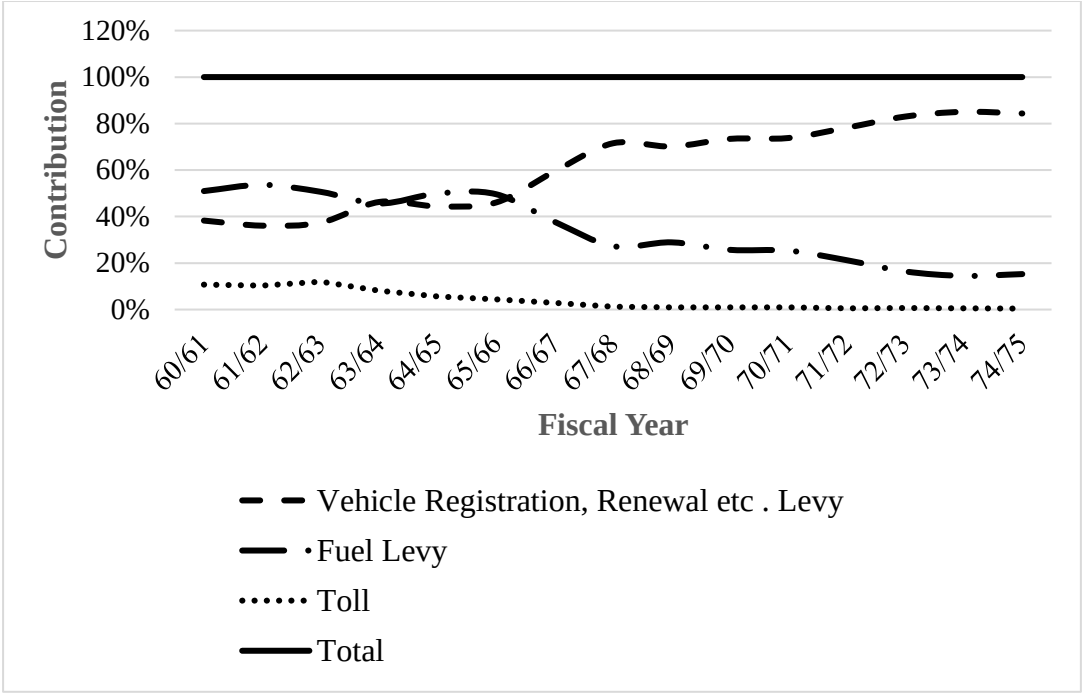

Figure 4-6 Share of Revenue Contirbuted

4.4 Expenditure Efficiency of Maintenance Branch

The Division offices of DoR has never been able to spend the approved budget completely. The reason may lie in the incompetent contractors winning contracts (because capable contractors are attracted to more profitable projects), ineffective monitoring body, inefficient contractual management, or their combination.

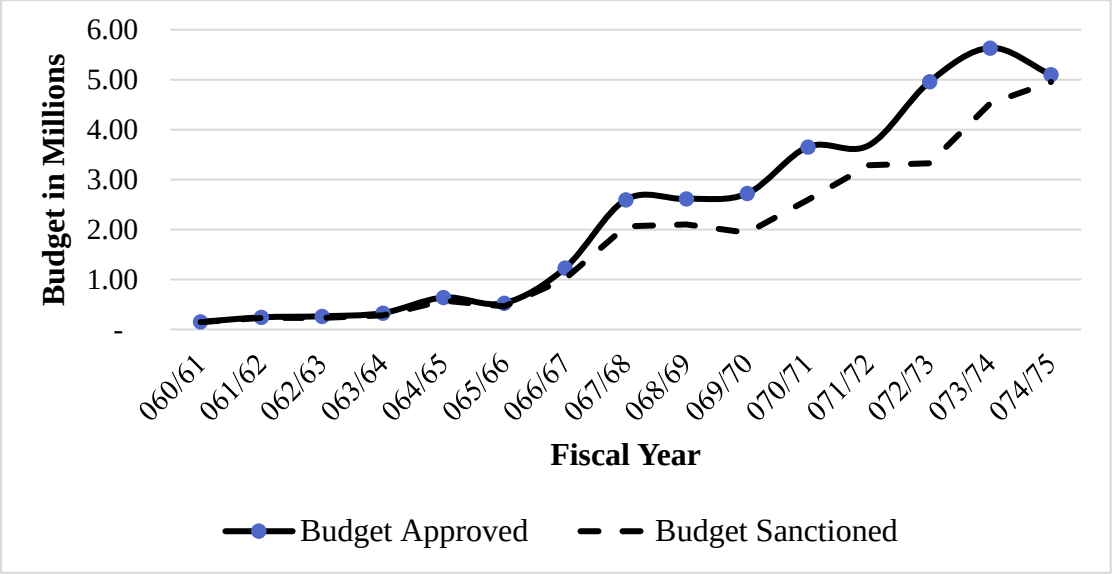

Figure 4-7 Approved Budget Vs Disbursed (Sanctioned) Budget

The efficiency to utilize the approved budget is subpar. The details are presented in the Table 4-2. It is observed in the Figure 4-7 that the gap has been an increasing trend. Even though the trendline of the disbursement percentage is declining as shown in Figure 4-8, it has been seen that more than 97% of the approved budget has been exhausted in F/Y 2074/75. Nevertheless, the capacity of contractors who wins the bid, the public entity who assigns the bid and the monitoring body (RBN) who deals with both is questionable.

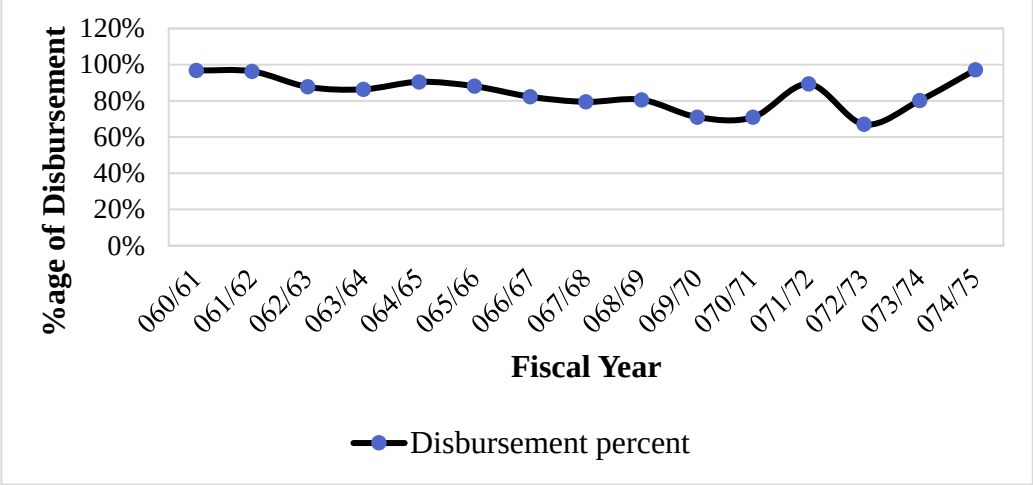

Figure 4-8 Expenditure Efficiency of Road division

Table 4-2 Details of Expenditure Efficiency of Maintenance Budget

Fiscal Year	Budget Limit	Budget Approved	Budget Disbursed	Disbursement percent
060/61	152,002,533.97	152,002,533.97	147,119,211.57	96.79%
061/62	242,420,101.00	242,420,101.00	233,415,505.24	96.29%
062/63	264,588,000.00	264,588,000.00	232,082,713.26	87.71%
063/64	329,276,450.00	329,276,450.00	284,398,889.36	86.37%
064/65	640,201,000.00	640,201,000.00	579,433,645.40	90.51%
065/66	512,521,770.00	527,521,770.00	464,578,813.72	88.07%
066/67	1,229,251,360.00	1,229,251,360.00	1,011,113,118.06	82.25%
067/68	2,645,376,233.00	2,597,530,083.00	2,063,394,807.72	79.44%
068/69	2,612,596,120.00	2,612,596,120.00	2,105,596,114.03	80.59%
069/70	2,722,065,720.00	2,722,065,720.00	1,933,293,765.22	71.02%
070/71	3,656,600,340.00	3,656,600,340.00	2,594,872,520.00	70.96%
071/72	3,685,432,701.00	3,685,432,701.00	3,290,846,026.17	89.29%
072/73	4,960,307,001.00	4,960,307,001.00	3,324,375,976.65	67.02%
073/74	5,636,651,268.71	5,636,651,268.71	4,523,702,875.00	80.26%
074/75	5,099,363,710.00	5,099,363,710.00	4,954,162,150.00	97.15%

4.5 Assessment of Sources of Maintenance Budget

From the analysis of heretofore data, it is now evident that the current sources (see Figure 4-9) of maintenance budget are incapable of holistically funding maintenance. The current funding is meeting on average of 30% of the annual need, which is a huge shortfall. Furthermore, in recent 5 years the approved limit of budget is below that. Without addressing this gap, expecting better road is not justified. And if the issue cannot be addressed even with all the database at hand, the hassle of data collection and management is just a waste of time.

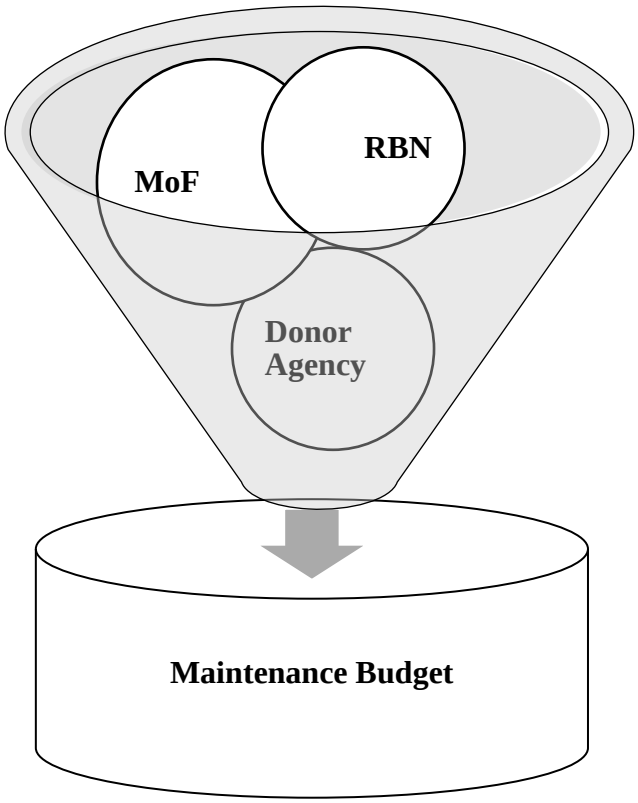

Figure 4-9 Current Sources of Maintenance budget

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

The data presented in the chapter 4 has exhibited that less than 5% of the road are in good condition while more than 50 % of them are in poor condition. It can also be inferred that the lack of funding is the major reason for the status quo of the pavement as we observed that lack of holistic maintenance is what causing the good and fair roads to deteriorate while the bad road is being tended to. The assessment of pavement condition in section 4.1 is quite revelatory that the roads are not what RBN imagined it to be during the establishment.

An average of 30% of the total need based is approved by the RBN to Maintenance Branch, which means that on average 70% of the budget is not met. The maximum percentage of budget approved by the RBN is on FY 2070/71 during the earthquake, while the minimum recorded is on 2074/75 at 19.14%. It has also been observed that in last 5 years, the budget limit of RBN has been below average, i.e. less than 30% of the required budget. The upward inclining trendline of resource gap is worrisome so key interventions have to be made now in order to save the disappearing roads. The backlog of maintenance has stacked up so high that it is going to cost a huge financial assistance to maintain those roads and bring them back to business. Without further ado, the backlog maintenance should be dealt with as soon as possible. A sustainable and innovative funding resource is imperative as its deficiency is further deteriorating the road asset, hindering the domestic growth and investment, and halting the national economy.

The total tax collection from vehicle registration and renewal shows an exponential increase over the last five years while the variation from other streams seem negligible. The contribution in vehicle registration in recent times is more than 80%, fuel levy is about 18 % while toll contribution is less than 1%.Increase in vehicles implies that the pavement damage has been accelerated and measures should be taken to charge the users equitably. As stated on the literature review of toll, horizontal equity can be achieved on the toll. Less than 1% contribution on pavement maintenance is unfair. Equitable rate shall be established for the toll and efforts shall be made to increase the revenue from toll adhering to the principle that *polluters shall be punished.*

The inefficiency in fund exhaustion depicts the incompetency of the RBN and Maintenance Branch in part or in whole. The partnership between the government and semi-government entity is not working out. Therefore, privatization is the best bet in the present scenario. In both developed and developing worlds, a surge has been observed in the private contribution to finance transport infrastructure, and such contribution has helped several countries to maintain, rehabilitate and expand their road networks. However, not all private partnership has been a success. An analysis of the experience with infrastructure development has revealed that PPPs need strong government support and engagement in order to be successful.

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