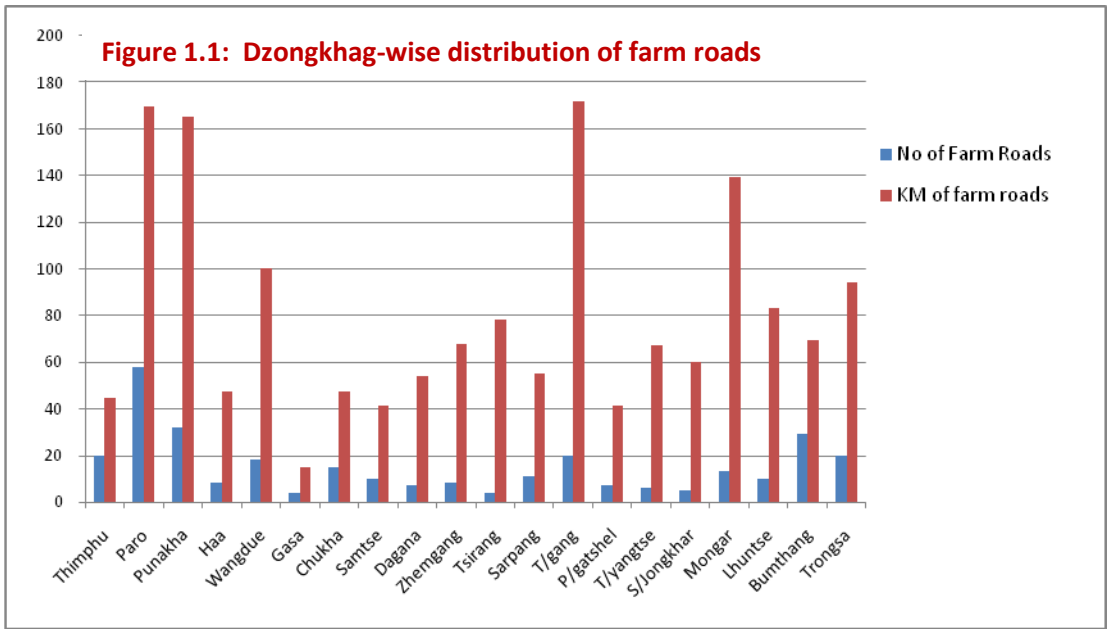
1 EXECUTIVE SUMMARY

Background

Road accessibility plays an important role in the development of national resources, industries and agriculture of a country and ultimately in raising the standard of living of its people. Only 40 percent of the Bhutan's population live within one hour's walk from the nearest road, and almost 40 percent live more than a day's walk from the road head. The poverty assessment found that the absence of roads was one of the major factors contributing to poverty[1]. Indeed, demand for farm roads features as a highest priority for most geogs in their development plans. Responding to the needs of the people and to enhance the livelihood of the rural population, the government has allocated substantial resources to construct farm roads and Power-Tiller Tracks (PTT) with the ultimate objective to raise the income of the poor farmers and make the rural life more attractive.

During the 9th FYP, 597.63 km of farm road construction were planned. At the end of the 9th FYP Plan, 1,064.84 km[2] was constructed which is 78% increase from the initial plan. In 10th FYP, a total of 3,265 km of farm roads have been planned. With the government according such importance to the construction of the farm roads, it is very important to ascertain the successful implementation of these activities.

The current Dzongkhag-wise farm road distribution is shown in the **Figure 1.1** below:



[1] Poverty Analysis Report 2007, NSB
[2] Agriculture Statistics 2007, MoA

Why RAA did this study?

The Ministry of Agriculture, with an objective to enhance the rural livelihood, initiated construction of farm roads and power-tiller tracks. In 9th FYP alone, 1,064.84 km of such roads were constructed, and the approved target for the 10th FYP is 3,265.00 km.

Recognizing the importance of farm roads to the rural community which constitute the major population of the country, the government has allocated huge resources on the constructions of farm roads. In view of huge resources allocated and importance of the farm road and PTT in the socio-economic development of the country, in particular enhancing the livelihood of the rural community, the RAA as required under the Constitution of the Kingdom of Bhutan and the Audit Act of Bhutan, 2006 conducted the performance audit of the farm roads. The audit was conducted with a view to ascertain whether the resources were being utilized economically, efficiently and effectively and ultimate objectives of constructing farm roads and PTT were being achieved. In doing so, the RAA not only looked at *"what has been done"*, but also *"what has not been done"* to achieve the organizations' ultimate objective.

The RAA conducted this audit with the following objectives:

- To check whether the prioritization process for construction of farm roads has been equitable and fair?
- To verify whether farm roads have been constructed on time, within the specified budget and in the required quality?
- To see if the farm roads have been constructed following EFRC method? and
- To report on impact of farm roads in the rural community.

What RAA found?

By and large, transport infrastructure remains the most desired developmental activity for the rural population. Farm roads have benefitted the public in several ways. Some of the apparent benefits accrued by the rural population from the farm roads are increased income, easy access to markets and other facilities like, health, education, geog office, RNR centre, etc. It is indeed a commendable effort on the part of the government to have accorded increasing priority on the construction of farm roads and allocated huge resources. Actual achievements in terms of physical target during the 9th FYP was commendable as the planned target was exceeded by 78%. Farm roads are the most effective means of transforming the rural livelihood. While the benefits of farm roads are immense and apparent, a separate impact study to determine the effectiveness of farm roads is yet to be conducted.

Achievement during the 9thFYP was commendable with construction of farm roads exceeding the planned target by 78%.

Even as the RAA acknowledge the complexities and difficulties in constructing farm roads, the program has suffered setbacks and weaknesses which could have been avoided or at the least minimized through proper and effective planning, survey and monitoring. Some of the major deficiencies observed by the RAA impeding the effective delivery of services to the community are summarized below:

- The RAA visited a total of two hundred sixty-six farm roads through-out the country. Out of which as many as forty-nine farm roads appear non-functional. Though some farm roads are temporarily non-functional as they were affected by the cyclone *Aila*. However, the very purpose of construction of these roads spending huge sum of money including community participations appear defeated;

  - *49 non-functional farm roads costing over Nu.200.00 million.*
  - *25 roads not-usable for lack of bridges.*
  - *12 roads not connected to productive area.*
  - *64 geogs not connected by roads, where as some geogs enjoy excessive connectivity.*
  - *Technical specifications and EFRC method generally not followed.*
  - *Lack of proper planning, survey, supervision and monitoring.*
  - *Substantial variations in cost of constructions of farm roads of as high as over 2000%.*
  - *Value for money in expenditure of over Nu.4.97 million on Consultant for supervision services was not achieved.*

- Twenty-five roads were rendered not useable because of lack of bridges, twelve roads do not connect productive areas, five roads were not found utilized after constructions for security or other reasons thereby impeding the effective use of public resources;

- It was observed that there was unbalanced distribution of farm roads amongst Dzongkhags and within the Dzongkhag;

- Sixty-four geogs were not yet connected by any kind of road at the end of the 9th FYP while some of the geogs were excessively connected;

- Planning and survey conducted for the construction of farm roads was not adequate. Many in the execution level attributed this to inadequate equipment, expertise, limited time frame and financial resources;

- Technical specifications as laid down in the guidelines were not followed. Roads have not been constructed following EFRC method.

- There was inadequate supervision and monitoring by the implementing agencies;

- Most Dzongkhags have not signed MoU with the beneficiaries; and

- Most of the roads were constructed without preparing detail drawings and designs, due to which roads were constructed following the rudimentary method of pegging and sometimes at the discretion of the local leaders, thereby, impeding the quality and longevity of the roads.

What RAA recommends?

Based on the document review, findings and analysis, the RAA offered certain recommendations with an attempt to address the identified deficiencies and weaknesses. Some of the significant recommendations requiring immediate attentions are:

- Proper planning, survey and prioritization should be carried out to ensure economy, efficiency and effectiveness in the constructions of farm roads and equitable and judicious allocation of resources. The Dzongkhag Rural Access Plan could form the basis for all future farm road development;
- The farm roads and PTT should be constructed conforming to the new guidelines issued by the Ministry;
- Detail studies should be conducted to establish the impact of farm roads;
- Appropriate training program for the construction of farm roads should be provided to the Dzongkhag engineers;
- Farm roads should be properly handed over to the beneficiaries to inculcate sense of ownership and belongingness;
- The bridges should be provided for those roads that were already constructed but not connected by the bridges;
- Appropriate measures should be undertaken including necessary repair and maintenance to ensure that all the roads are pliable;
- Base course and proper drainage should be provided to ensure longevity of farm roads;
- Considering the significance of farm roads and size of resources being allocated, the Ministry may review the need for establishing a central unit or division to oversee the farm road constructions in the country, frame related policy and guidelines, and carry out timely monitoring and periodic physical inspections to ascertain the conditions of the road;
- Dzongkhag-wise centralised inventory of farm roads should also be maintained for information and judicious allocation of resources for farm road constructions in the future.

2 INTRODUCTION

The Ministry of Agriculture is the nodal agency to facilitate, coordinate and mobilize resources for the construction of farm roads. Projects such as Decentralized Rural Development Project (DRDP), World Bank concentrating in the six central Dzongkhags, Agriculture Marketing and Enterprise Promotion Program (AMEPP), IFAD projecting in the six eastern Dzongkhags, JICA and various other projects with RGoB are funding the construction of farm roads. However, the implementations of the construction activities are with the respective Dzongkhags.

Since the road access is an important catalyst for development, the Ninth Five-Year Plan placed high priority on infrastructure expansion particularly with respect to feeder roads and farm roads to improve rural access and urban linkages. The MoA was given the mandate of constructing farm roads linking potential surplus areas to markets and facilitates the movement of inputs to farmers. The government contributes to this initiative by providing construction and maintenance equipment and technical support, while farmers contribute voluntary labour.

The main objectives of the Farm Roads Programme are:

- *To link potential Agri-horticultural production areas in the hinterland to Market;*
- *To bring production areas and farmers closer to markets and other social amenities;*
- *To open up production and potential production areas for more intensive farming through farm mechanization;*
- *To improve efficiency in delivery of inputs and services to villages/farms;*
- *To improve accessibility from villages in order to make rural life more attractive.*

With road accessibility as one pillar of the 'Triple Gem' approach of the MoA, during the 9th FYP a total of 1,064.84 km of farm roads had been constructed. The Dzongkhag-wise farm road construction during the 9th FYP is shown in **ANNEXURE I**.

Farm Roads Development Strategy

To achieve the above objectives, the MoA has developed a strategy and framed the guidelines for farm roads development.

The farm roads development strategy underlines that:

- Selection of farm roads shall be governed by several parameters/selection criteria as specified in the MoA Guidelines for farm roads development;

- Where prioritization is necessary because of resource constraint, priority shall be given to those potential areas with fewer roads if all other criteria are met;

- Farm road development will be taken up in an Environment Friendly Method and in accordance with guidelines of the MOA, to ensure long-term sustainability;

- Participation by beneficiaries in all stages of farm road development is necessary. A similar approach to that of National Irrigation Policy will be adopted;

- Surveys of farm roads will be done on a multi-disciplinary basis encompassing socio-economic, techno-feasibility, and environmental impacts to ensure long term viability.

Achievements

The MoA has made commendable efforts in achieving the 9th FYP target by constructing 1,064.84 km of farm roads as against 597.63 km planned for construction, exceeding the target by 78%. The farm roads have benefited the rural population in several ways. Some of the apparent benefits accrued by the farmers from the farm roads are increased income, easy access to markets and other facilities like, health, education, geog office, RNR centre, etc. Recognizing the manifold benefits accrued from the farm roads, the government have accorded increasing priority on the construction of farm roads and allocated huge resources. Farm roads are most effective means of transforming the rural livelihood and reducing the poverty incidence. Some of the specific achievements as observed by the RAA attributed to farm roads are as follows:

✪ Connectivity to the markets

Most of the farmers in the rural areas have started to engage themselves in

Dairy farmers' cooperative: Khapti-Bikhar farm road in Trashigang

Potato farmers' cooperative: Kharzadurung farm road in Trashigang

productive agricultural activities because of the accessibility to the farm roads. Connectivity to the market has given the farmers opportunities of enhancing their rural income. Activities like farmers' co-operatives for agricultural products and improved livestock holding are emerging in the rural areas indicating a shift from subsistence farming to commercial farming.

✪ Improved standard of living

As a result of increased accessibility to the markets, farmers have been able to improve their livelihood with increase in their incomes. Sale of agriculture and livestock products has become much easier and profitable for the farmers as they can now sell their produce in the urban areas and fetch better prices. One of the factors contributing to the rising standard of living of the rural population is attributed to farm road connectivity.

✪ Increased access to other facilities

Farm roads have also improved accessibilities to other facilities such as health, education, geog office, RNR centre, etc.

✪ Properly maintained roads

.In a few instances the rural community had undertaken the maintenance of farm roads to keep them in pliable condition. For example, farm roads of Lumang and Udzorong geogs in Trashigang were maintained by the respective communities. This has created the sense of belongingness and ownership of the rural community.

Village workers at the maintenance site in Udzorong farm road, Trashigang

3 FINDINGS

3.1 PLANNING

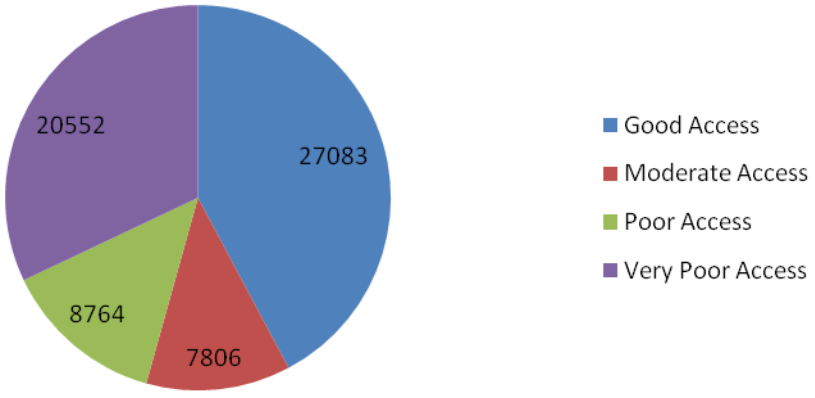
3.1.1 Prioritization of farm roads not done following due processes

The proposal for farm roads is done at the GYT within the geog, and decided by the DYT at the Dzongkhag level. However, the DYT approves the plans without further screening and prioritization. The Guidelines for Farm Roads Development (2002) stipulates the requirement of prioritization based on the potential of agricultural productivity and connectivity. The places with higher potential of agricultural productivity and with fewer roads connectivity need to be given priority. However, in most cases it was done without following the due process of prioritization. It has also not considered needs, number of beneficiaries and the availability of resources, leading to uneven distribution of farm roads amongst various geogs and Dzongkhags.

All the geogs in Bumthang Dzongkhag have good road access as they are connected extensively by farm roads and National Highway. Conversely, Zhemgang has eight geogs with only two geogs connected by motor-able road. Six geogs remain isolated from facilities that other geogs enjoy.

In Paro and Bumthang Dzongkhags, 95.84% and 93.16% households respectively have got good access to roads, whereas 73.20% of households in Gasa and 59.47% of households in Pemagatshel are still with very poor road access. The Dzongkhag-wise road access is given in ANNEXURE II. Such variations in allocation of farm roads indicate disparity amongst Dzongkhags. One of the main hurdles in provision of farm road was the provision of bridges, which has viciously affected some Dzongkhags by depriving farm roads on the ground of requiring bridges incurring huge expenditures.

Figure 3.1: No. of households and road accessibility



Source: DRAP Reports, June 2006

The pie chart shows the number of households with respective road access in Bhutan. 27,083 households have good access indicating less than 30 minutes of walk to the nearest road. 7,806 households have to walk for 30 minutes to one hour, whereas 8,764 households are 1-2 hours walk away from the road head. There are still 20,552 households representing over 32% requiring to walk more than two hours from the road head. The statistics indicate that the government has a long way to go in providing the public with proper road access and equitable facilities. However, the government has taken encouraging effort to connect all geogs by the end of 10th FYP with motor-able road.

3.1.2 Pre-feasibility study such as socio-economic & techno-feasibility not conducted

Planning and survey play an important role in the construction of farm roads. Cases of landslides, non-functional farm roads, problems of gradient, more than one road for the same community, roads running parallel to other roads can be avoided with adequate survey and proper planning. The Guidelines for Farm Roads Development (2002) was developed to assists the MoA, Dzongkhags and farmers to incorporate technical, economic, social, environment and management parameters for planning and designing, implementation and maintenance of farm roads.

There was no practice of preparing detail drawings and designs due to which roads were constructed following the rudimentary method of pegging and sometimes at the discretion of the local leaders.

However, as observed in all the constructions of farm roads, the proper survey and planning was not carried out. These lapses have resulted in poor conditions of road, resulting to huge maintenance cost and in some cases, abandonment of roads. For instance, roads like Khapti-Bikhar road in Trashigang, Gaylongkhar-Serthi road in S/jongkhar and Chokorling farm road in Sarpang were constructed without socio-economic and techno-feasibility studies.

3.1.3 Inadequate participation from the beneficiaries in all stages of farm road development

Bidung farm road (Trashigang): high gradient and sharp curves

Kilikhar-Laptsa road (Mongar): sharp curves

Construction of farm roads entails equal participation from the beneficiaries to enhance smooth construction process. It was observed that in many cases, beneficiaries refused to allow the takeoff point, land for construction, etc. resulting to change in plan at the time of execution. Changes in plan further led to realignment causing problems like steep gradient, wasteful expenditure, sharp curves, and constructions through landslide prone area. Such problems at the time of execution phase would have been avoided, had the administration initiated proper consultation with the beneficiaries and the cooperation assured from them. One of the reasons cited for lack of cooperation from the beneficiaries was found to be the inadequate compensation for the loss of one's land resulting in refusals to part with their holdings.

Lack of adequate compensation for loss of land cited as the major hurdle in securing support from the beneficiaries

Kilikhar-laptsa road in Mongar had steep curves because of beneficiaries not agreeing with the take-off point whereas, the Bidung farm road in Trashigang had very high gradient because of beneficiaries not allowing the road in their land.

3.1.4 Beneficiaries not properly identified

The Guideline for Farm Roads Development (2002), stipulates that the farm road constructions should benefit an average of 10 households per kilometer. However, the Guideline does not define the benefitting households in terms of distance of households from the farm roads being proposed for constructions. Therefore, the Guidelines seem to lack such fundamental inputs to decide on the prioritization of farm roads based on number of beneficiaries, and leaving it susceptible for misinterpretation and possible abuse. For instance, the 13 km Tsangchutham-Martsalla road is indicated to benefit 975 households, but the audit team found that the actual direct beneficiaries were only around 40 households located at the peripheral villages of the geog centre. The rest of the villages were more than two hours walk from the road head, though indicated as direct beneficiaries giving wrong information to the decision makers. Thus, if only 40 households were to fall under the definition of beneficiary as per the Guidelines, the farm road would not have been prioritized and constructed.

The MoA agrees that beneficiaries need to be properly identified and have proposed for a clear definition of the beneficiaries.

3.1.5 Under-utilized farm roads

On site visit, it was observed that there were farm roads ending either in the forest, hill-tops or barren lands where there are no settlements. Such instances were observed in places like Mongar and Bumthang, and these roads now appear abandoned. The reason cited for construction of such roads (Ura-Pangkhar and Ura-Doshi Farm Road) in Bumthang, stretching 2.09 km in length at the cost of Nu. 1.30 million was to connect productive areas in future.

Like-wise, Kilikhar-Laptsa road (7 km in length) in Mongar constructed at the cost of Nu. 2.70 million under DRAP project ends on the hill-top. While the road could benefit the community of Kilikhar, road stretching beyond the village to the hill top has no direct benefits to the public. The reason cited for construction of extra length (approx. 3.50 km) beyond Kilikhar was to connect Drapong in future. Though Drapong is adequately connected by farm road from Gyelposhing, the administration plans to lay alternative route from Kilikhar.

Ura-Pangkhar road (Bumthang)

Road lead to open barren land. Ura-Doshi road (Bumthang)

Kilikhar-Laptsa road ends on a hill top (Mongar)

Kalapang- Resa road: ends in a forest (Mongar)

The MoA, however, indicated that these roads will have usages in the future when the areas become productive and when the roads are lengthened to connect potential productive areas. Considering more pressing needs for farm roads in other geogs and Dzongkhags and overall resource constraints, construction of such farm roads for possible future use may not be judicious and appropriate.

Instances of farm roads constructed at a cost of over Nu. 17.00 million that are under-utilized have been detailed in **ANNEXURE III.** **(Detailed response of MoA in Appendix A)**

3.1.6 Unplanned activities carried out

During the 9th FYP, 597.63 km of farm road construction was planned including the spill over of 39 km from the 8th FYP. An additional request for 455.5 km was received and more proposals continued to come in. At the end of the 9th FYP in 2007-2008, 815.82 km of farm roads were already constructed and an addition of 249.02 km was on-going. Thus, about 78% of constructions constituted unplanned activities. While such constructions could have been unavoidable, unplanned activities of such magnitude will inevitably have bearing on the quality and progress of planned works besides impeding effective monitoring and supervision.

Figure 3.2 Planned roads vs. unplanned construction in the 9th FYP

Figures in Kilometers

3.1.7 Roads leading to religious institutions

Farm roads are primarily intended to connect agriculturally productive areas to enhance the income of the rural population. However, there were many cases observed where the farm roads led to religious institutions. Such cases of roads are tabulated below:

Sl. No	Name of the Farm Road	Dzongkhag	H/holds benefitted	Construction Cost (Nu. in millions)
1	Galing Goenpa-Rinsey Lhakhang farm road	Trashigang	1	1.312
2	Jangchubling farm road	Lhuentse	57	17.262
3	Tsangkha-Jabrathang farm road	Trongsa	N/A	N/A
4	Pedseling farm road	Bumthang	N/A	4.000
5	Depsi farm road	Thimphu	1	1.608
6	Kapathabsa to sachena to Nangsi Goenpa	Punakha	13	3.37
7	Semkha to choegodaysa	Paro	84	N/A
8	Gepkha to Dokha	Paro	22	N/A
9	Gorina	Paro	47	2.970
10	Shaba school to Nayphu Goenpa	Paro	31	N/A
11	Tshongkha-Phutugoenpa	Paro	15	N/A
12	Silugoenpa farm road	Paro	31	N/A

Though some of these farm roads benefited many households, there may be a need to prioritize the provision of farm roads primarily to connect the agricultural productive areas benefitting the larger number of households.

3.1.8 Farm roads appearing abandoned

Farm roads should be constructed after assessing the requirement and the benefits expected to accrue to the community. However, there are some farm roads that failed to benefit the farmers which appeared abandoned with consequential waste of huge resources. Some of the abandoned farm roads are listed in the table below:

Sl. No	Name of the Road	Dzongkhag	Expenditure (Nu. In millions)	Length (Km)
1	Kalapang-Resa farm road	Mongar	1.268	1.00
2	Kado farm road	Samtse	1.000	
3	Nabji-Korphu	Trongsa	8.555	29.00
4	Wangtakpa-Crasfaipam	Zhemgang	0.609	4.50
5	Chokhorling farm road	Sarpang	1.818	8.00

On site visit, it was observed that Nabji-Korphu farm road was abandoned after a bridge connecting Nabji and Korphu was washed away. It was also observed that nothing was done to maintain the existing infrastructure as it was damaged by excavated materials and boulders from the construction of Tingtibi-Zhemgang by-pass at some stretches.

Chokorling farm road (Sarpang)

The construction of Chokorling farm road was found a total waste of government's resources as it does not deliver any services to the public. As depicted in the photograph, it appears abandoned after constructions as it being very near to Indian border and being raged by wild animals. Moreover, there is no settlement to be benefited by this road.

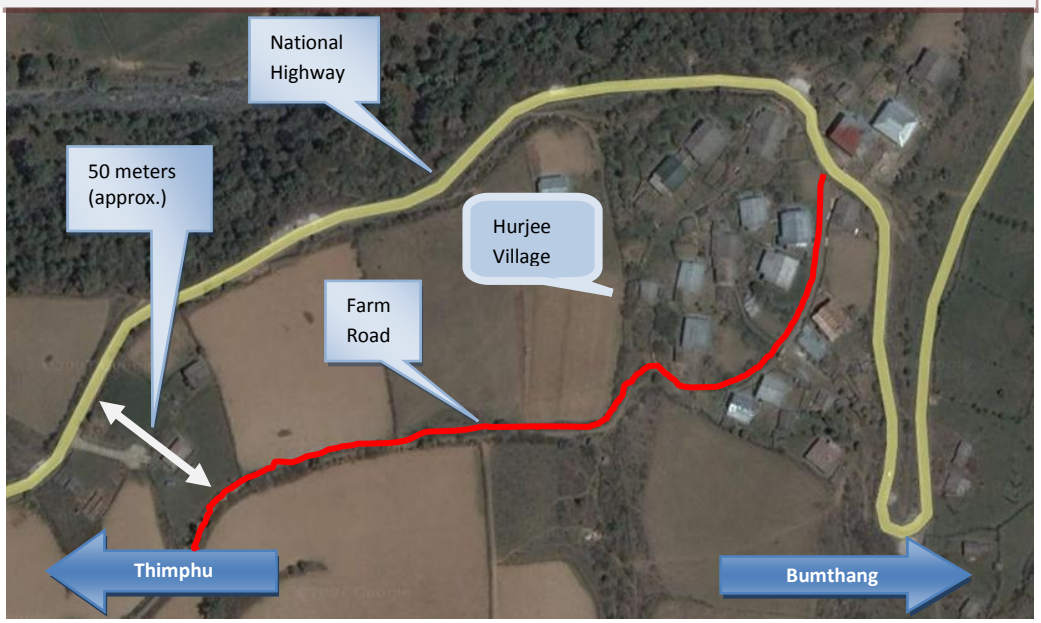
Some roads were abandoned as they were damaged and not maintained. Such incidences reflect improper need assessment and ineffective use of scarce resources.

In response, the MoA stated that some of the roads are under construction and will be continued in the 10th FYP and some were not maintained for security reasons. **(Detailed response of MoA in Appendix A)**

3.1.9 Provision of farm road without proper need assessment

There are some farm roads such as Hurjee farm road (1.36 km in length) in Bumthang constructed at the cost of Nu. 0.90 million running parallel to National Highway with approximately 50 metres horizontal distance between the two.

Figure 4.1: Farm Road parallel to Highway in Hurjee village, Bumthang



Similarly, the village of Berthey, Zhemgang was already connected by a forest road of 6 km. It was, however, observed that a Tingtibi- Berthey farm road of 5.3 km was constructed at the cost of Nu. 3.4 million. On enquiry it was learnt that the farm road was constructed because of high gradient at one stretch of the forest road. However, even the new farm road could not benefit the community due to blockage at several stretches of road, though it was reported that the farm road is not yet handed over by the contractor.

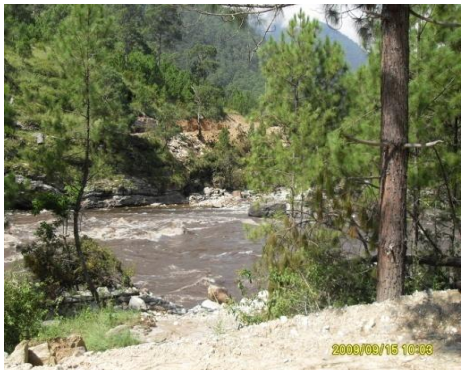
Provision of such road in places that are located in close proximity to high-ways or other motor-able roads could have been avoided or deferred considering pressing needs of other places and overall resource constraints. This may also result in disparities amongst various geogs and Dzongkhags. It is indicative of inadequacies in planning, prioritization and allocation of resources judiciously.

3.1.10 Farm roads without bridges

The Guideline of Farm Roads (2003) states that construction of bridges for farm roads will not be funded. The respective Dzongkhags were required to make their own arrangements if bridges were required. Providing roads to villages has therefore, suffered a huge setback because there are many roads without bridges and thus, rendering the farm roads un-usable. The RAA noted that as

many as twenty five roads which could not be used effectively in absence of bridges. Farm Roads requiring the bridges are listed in **ANNEXURE IV**.

Tokhaphu-Rabti farm road (Trashiyangtse)



Gorgan-Jarey farm road (Lhuentse)

The constructions of such farm roads without provision of bridges indicate lack of proper planning and coordination, causing ineffective use of infrastructures created.

3.1.11 Farm roads of less than 1 km constructed

There are farm roads provided in places under Paro, Haa, Bumthang and Thimphu which are only few minutes walk from the existing road head. Farm roads with length of less than 1 km were constructed in these places as listed in **ANNEXURE V**. Considering that there are still 20,552 households located in places involving more than two hours walk from the nearest road head, allocation of resources for construction of roads as listed in **ANNEXURE V** may indicate injudicious use of resources. It may also be attributed for not having done the proper need assessment.

3.2 RESOURCES

3.2.1 Shortage of engineers at the Dzongkhag

An executive order no. PM/01/08/1150 dated 10th March, 2008 from the then Prime Minister states, "*In order that the huge investment in social and economic infrastructure yield excellent returns in terms of quality and durability, and as resolved during the meeting held on 14th January 2008 with district engineers and concerned agencies, henceforth, engineers in Dzongkhag shall not be assigned to more than five works, the distribution of which shall be judiciously done by the Dzongkhag engineer considering site location and magnitude of work*". However, many construction activities were planned without consideration of availability of engineers, resulting in poor monitoring and supervision of works, affecting the quality of constructions.

For instance, Bumthang Dzongkhag had planned seventy one construction activities for one fiscal year with only four site engineers. Shortage of

engineers also poses great problems at the Dzongkhags as works get delayed because engineers need to look after different types of works. Most of the site engineers are not able to concentrate on one particular work, thus, compromising on the quality of works. Engineers do not have enough time to plan, survey and design, which is a major reason attributed for poor quality of farm roads.

3.2.2 Inadequate financial resources

Construction of roads entails huge costs. The government has been trying to secure funds through various projects and own financing. The fund allocation for farm roads during the 9th FYP is unusually low with about Nu. 1.3 million per km as per the funding agreement with the AMEPP project. Such budgetary problems have resulted in poor quality works without proper permanent works as required, leading to huge maintenance costs consequently. With various projects and different financial agreements and arrangements, it is very difficult at the implementation level to include all necessary works in constructing quality roads. This has led to poor quality works and improper management of these assets.

Most of the Dzongkhag officials stated that limited fund for construction of farm roads was the main reason in not being able to provide permanent works in all required places thereby, resulting in poor condition of roads. However, the unit cost for construction has now been revised to Nu. 3. 00 million per km.

3.2.3 Insufficient survey and design equipments

Rugged terrain and topography pose a daunting challenge to construct roads in Bhutan. Therefore, proper detailed survey and design for construction of farm roads require sufficient and quality equipment. Surface survey instead of detailed survey and improper design are resultant from the fact that most of the engineers and surveyors are not provided with sufficient equipments and time to carry out the required work. Therefore, inadequacies in survey and design contributed in non-adherence to the of technical specifications in the field.

> It is further aggravated having to comply with the provision of 60% forest cover at all times as provided in the Constitution of the Kingdom of Bhutan.

3.2.4 Insufficient machineries

Performance of the respective Dzongkhags and geogs depend on the completion of planned activities on time. However, with only one machine per site provided by the CMU for some Dzongkhags, it proved difficult for Dzongkhag to complete the assigned activity on time. There were instances where only one bulldozer or an excavator was assigned for the construction of farm roads.

Lack of adequate machineries also led to dumping of excavated materials downhill which is detrimental to the environment. In many instances, it was also observed that the excavator operator was the only person at the site.

Ramjar farm road constructed only with a bulldozer

Gorgan-Jarey farm road one excavator

Orong-Wooling farm road the machine and operator only at work

Stranded lone excavator in Doloungang-Pangkhay farm road

Therefore, the monitoring and supervision was generally lacking resulting to poor quality of works.

3.3 EXECUTION

3.3.1 Non-adherence to technical specifications provided in the "Guideline for Farm Roads"

Many instances of gradient problems, non-maintenance of the required slope and steep and sharp curves were observed in many of the construction of farm roads. The Guideline for Farm Roads (2002), requires certain technical specifications to be followed to ensure proper functioning of the farm roads. However, these provisions were not complied in actual situations. Non-maintenance of required slopes have led to road blockages due to erosion, high gradients have made the roads virtually non-pliable, and steep and sharp curves restrict the smooth flow of vehicles.

Ramjar farm road: steep gradient

Jamkhar farm road: slope and gradient not maintained

Nangnak farm road sharp curve (Bumthang)

Tsaluna farm road: steep gradient (Thimphu)

As per the engineering parameters outlined in the Guideline for Farm Roads Development (2003), one passing should be provided for every kilometre of farm road. This was done to ensure smooth flow of traffic in peak seasons. However, the audit team observed that one passing for every kilometre was not provided in most cases.

3.3.2 Farm roads appearing non-functional

During site visits of farm roads spread across the country conducted by the audit team, which coincided the period after cyclone *Aila*, the team observed that forty nine out of two hundred sixty six farm roads visited appeared non-functional, representing 18.42% (cost could not be ascertained due to non-availability of data) of farm roads that cannot be used as exhibited in **ANNEXURE VI**.

Such a magnitude of investment going astray should be a cause of concern to our decision makers. The audit attributes the causes for non-functional farm roads to poor quality of works at the time of constructions, either due to lack of adequate monitoring and supervision or to tight budget driven construction as reported by the implementers. Though some damages to these roads were attributed to natural calamities and the monsoon menace, it could have been largely avoided, had the quality been maintained at the time of construction. It was also observed in some cases that, no effort had been made to maintain

these roads, and there is lack of clear policy on maintenance as it does not clarify the party responsible for maintaining it.

Though, most damages to farm roads were attributed to cyclone *Aila* during the period of audit, the respective Dzongkhags and geogs should make necessary arrangements to ensure that traffic flow is not disrupted in these roads for a considerable period of time.

Rinsey Lhakhang farm road (Trashigang)

Tharphel PTT (Trashiyantse)

Gola-Deorali farm road (Samtse)

Balagang farm road (Dagana)

3.3.3 Poorly constructed farm roads – Roads made pliable only after maintenance

It was observed that some of the roads were poorly constructed resulting in roads being pliable only after maintenance or reconstruction. This has resulted into extra expenditure on the same road. Such roads are listed in the table below:

Name of the Road	Dzongkhag	Construction cost (Nu. in millions)	Maintenance Cost (Nu. in millions)	Remarks
Balakgang farm road	Dagana	0.250	N/A	
Samay farm road	Dagana	N/A	0.8	
Fawan Domkhar farm road	Lhuentse	5.686	N/A	The road was not pliable, so had to be realigned and changed the gradient.

The poor quality construction of farm roads, resulting into avoidable extra expenditure were mainly attributed to lack of adequate supervision and monitoring during the time of constructions.

3.3.4 Roads with high gradient

The Guideline for Farm Roads (2002), states that gradient of the farm roads should be maintained below 10 degree. However, during the field visits, the audit observed that there were many instances where the gradient was above 10 degrees posing risks to the commuters. The details of roads in which exceptionally high gradients were observed are given in **ANNEXURE VII**. It is indicative of lack of proper planning, and poor supervision at the time of construction.

3.3.5 Huge variations in cost of construction of farm roads

The constructions of farm roads entail deployment of huge resources of the government. Our analysis of one hundred sixty seven farm roads on the basis of information made available by the Department of Agriculture indicated that the cost of constructions of farm roads across the country varied significantly. Cost of constructions varied from as low as Nu. 0.070 million per km to as high as Nu.3.23 million per km (i.e., over 2000%) as exhibited in **ANNEXURE VIII**. The variations are computed from the minimum range of unit cost available, i.e., Nu.0.07 million per km for Sakarmey-Laptsha farm road under Mongar Dzongkhag. The significantly plummeted figure in the case of Sakarmey Laptsha road is attributed to the deployment of CMU's machineries and engagement of community labour free of cost. Generally, the variations are attributed to the differences in topography and geographical locations of the farm roads. However, the alarming cost figure such as in the case of Damji-Jabesa (Nu. 2.22 million per km) and Ngatshang-Woongchiloo (Nu. 2.30 million per km) are cases indicating that the expenditures are not controlled, and probably lacked close supervision and monitoring. It also indicates possible disparities in community participation as some farm roads are constructed through community participation, whereas in other cases through government funding. Huge differences in costs warrant detailed analysis to ascertain the reasons for variations and initiate cost control measures by studying the cost effective methods of constructions enjoyed by various projects.

It was also observed that there appear some differences in data obtained from the Ministry and the Dzongkhags, indicating lack of accurate and comprehensive record of farm roads maintained at any level.

3.4 MONITORING AND EVALUATION

3.4.1 Poor monitoring and evaluation at the ministerial, Dzongkhag and geog level

Monitoring is critical to ensure smooth flow of works and adherence to the specifications and guidelines. However, it was observed that regular and timely monitoring was lacking. In some cases, it was found that only the excavator operator was at site, whose works was not supervised. As such, the executions of works are not in conformity to the technical specifications and EFRC method of road construction.

Site visits by the Dzongkhag offcial is essential to monitor the situation and condition of the farm roads. During audit, it appeared that most Dzongkhag officials were not aware of blockages and landslides until the audit teams conducted field visits. The Dzongkhag attributed this to the shortage of manpower.

3.4.2 Impact assessment not carried out

Impact review or assessment forms the core of a project cycle. A project is not complete unless an impact assessment is carried out. The Ministry of Agriculture has not carried out any impact assessment to assess the benefits accrued from farm roads, problems encountered and suggestions for future improvements. With the government already emphasising on more roads, the mechanism should be instituted to manage and maintain these infrastructure. It is also very crucial for the MoA to find out whether the roads are serving their intended purpose. The Ministry had also not evaluated the benefits and needs of the farm roads.

Impact evaluation assesses the changes in the well-being of individuals that can be attributed to a particular intervention, such as a project, program or policy.

Figure 3.4.1 Project Life-cycle

The **Figure 3.4.1** illustrates the life-cycle of a project, where **impact assessment** or project review would ascertain the need for investment and its cost-benefit analysis. It would provide information on the success or failure of a certain project and lessons to be learnt from them. Without such intervention to assess the benefits of a project, it does not appear appropriate to venture into such a project with huge investment.

3.5 MANAGEMENT OF FARM ROADS

3.5.1 Inadequacies in allocation of maintenance budget

The maintenance of farm road is critical to its longevity and continuity in delivery of its services. While the Guideline for Farm Roads (2002), states that minor maintenance works will be carried out by the beneficiaries, major maintenance shall be done by the respective Dzongkhags.

However, it was observed that only some Dzongkhags like Paro, Punakha, Mongar and Trashiyangtse were provided the maintenance budget as exhibited in **ANNEXURE IX**. In most Dzongkhags no maintenance budgets was provided even for cases where roads were badly damaged. In some Dzongkhags, the community engage themselves in maintenance, whilst in some maintenance was carried out through government fund. It may therefore, be necessary to review and rationalize the existing methods and practices of resource allocation for the maintenance of farm roads.

3.5.2 Operation and maintenance manual for farm roads not prepared

Operations and maintenance manual was supposed to be prepared by respective Dzongkhags, and distribute to the beneficiaries for management of farm roads after the MoU was signed. The manual has to provide instruction on the usage of farm roads and basic maintenance information. However, none of the Dzongkhags had provided the beneficiaries with the manual and they could not carry out maintenance works as required. Therefore, there is an ardent need for such manual to guide the beneficiaries in maintenance of infrastructure.

3.5.3 No MoU signed between the beneficiaries and the Dzongkhags

As per the Guidelines for Farm Roads Development (2003), once the farm roads are completed a MoU has to be signed between the respective Dzongkhags and the beneficiaries for the operation and maintenance. Although, some Dzongkhags have handed over the roads to the beneficiaries and signed the MoU, most Dzongkhags failed to comply with the provisions laid in the Guideline. This has resulted in non-maintenance of roads in these Dzongkhags as it failed to communicate and hand over the responsibilities of maintenance. The MoU signed with the beneficiaries also help to inculcate the sense of ownership in them.

3.5.4. Poor quality of works carried out through outsourcing

During the 9th FYP, the MoA initiated a concept of outsourcing important works

Buli-Nimshong Farm Road,Zhemgang

Tshangkha Farm Road, Trongsa

like Survey and Design, Geo tech studies, Environmental studies, Social studies and supervision works to a private party. Accordingly, M/s Kyingkor Consultancy was awarded to undertake the above mentioned works aggregating to Nu.8,766,764.00 as exhibited in **ANNEXURE X**. The outsourcing was mainly done to reduce the burden on the Dzongkhag engineering cell.

Though no separate evaluation could be carried out for services like Survey & Design, Geo tech studies, Environmental studies and Social studies, it was observed that the supervision service costing Nu.4,966,802.00 through outsourcing could not yield any additional value to the system. In fact, on site visits of roads constructed through outsourcing as exhibited in the photographs, it was found that works are generally of very poor quality. The firm has not rendered proper supervision, and the administration has not monitored the works of the firm, leading to construction of poor quality farm roads, with very little value for money achieved through outsourcing. The MoA however, indicated that quality of constructions also depends on proper survey, design, and inclusion of appropriate structure, drainages and use of EFRC measures besides the supervision. It is felt that the consultants engaged to design and supervise the works entailing substantial payments should have ensured that minimum quality standards as specified in the technical specifications were met. **(Detailed response of MoA in Appendix A)**

3.5.5. Lack of capacity to monitor constructions and management of farm roads

The Ministry of Agriculture is the central agency overseeing the policy matters, development of guidelines and other aspects pertaining to farm roads. It does not have the requisite capacity to oversee the effective implementation of farm road projects in the country, which are implemented by respective Dzongkhags

and funded under different sources of funding. Even with the Farm Road Section under the Department of Agriculture, there is a lack of adequate capacity for monitoring and effective management of farm road projects. Neither the complete inventory/cost details of farm roads were readily available nor was the compliance of technical specifications monitored. Thus, there is a need for strengthening the farm road section for effective implementation of farm road projects.

3.5.6. Inadequate centralized inventory of farm roads

Farm roads are assets created through huge investment. The maintenance of proper and updated central inventory indicating cost, length, types, conditions and locations, etc. of farm roads are vital for effective management of farm roads. Lack of such vital information also impedes decision making process and judicious allocation of resources. However, the information received from the Ministry and those form the Dzongkhags are not complete, and in some cases not consistent. There are different figures for the inventories on the farm roads at the Ministry and Dzongkhag level leading to inaccurate and inadequate information.

3.6 ENVIRONMENT

3.6.1 Non-compliance to EFRC

The Article 5(3) of the Constitution of Bhutan stipulates that *"The Government shall ensure that, in order to conserve the country's natural resources and to prevent degradation of the fragile mountain ecosystem, a minimum of sixty percent of Bhutan's total land shall be maintained under forest cover for all times".*

The farm roads and PTT constructed in the 9th FYP has not adhered to any type of environmental measures though the BOQ has implicit provisions for environmental cost. No farm roads were constructed following environmental provisions with a designated place to dump the excavated loose soil. All excavated materials including felled trees, boulders and soil were

Use of EFRC approach for the farm roads has not been the subject of economic analysis, but recent studies of EFRC use for feeder road suggests that this practice is economic, with net benefits after nine years. The initial investment in the first two years of construction of an EFRC feeder road is about 30 percent higher than that of traditional practice, increased attention to standards and quality means that maintenance and monsoon restoration costs are subsequently lower over the road's lifetime. EFRC also leads to lower vehicle operation costs, fewer roads blockages, less damage to flora & fauna and land and cultural property. (Source: PAD, DRDP)

dumped downhill blocking water flow downstream. Slope failure was noticed in most stretches of almost every road. Some of the major problems in implementation of Environmental Management Plan (EMP) are cited below:

- ✓ Lack of effort from authority/contractor;
- ✓ Tender documents not complied on the environmental requirements;
- ✓ EMP prepared could not be implemented as it appeared too theoretical or impractical at site;
- ✓ Lack of proper communication/coordination among the parties or workers;
- ✓ Lack of enforcement of rules and regulations at site;
- ✓ Very expensive;
- ✓ Lack of close supervision and monitoring from the Dzongkhag.

During site visits, the audit teams noticed loose soils being dumped along with uprooted trees downhill completely damaging the environment.

The environmental clearances issued by the Dzongkhags and the National Environment Commission also specifically mentions that EFRC techniques should be adopted to ensure minimal destruction to the environment. However, most of the farm roads have not adopted EFRC techniques.

The excavated soil and other materials were dumped over the edge of the roads not adhering to the clauses of the environmental clearances.

3.6.2 Provision of improper drainage

Drains serve a vital purpose by providing the road with required passage for the surface water. Proper drainage gives the road the strength to withstand rainfall and avoids the adverse effect of water on the roads. The formation of corrugation on the roads resulting into deterioration of the conditions of roads was mainly due to absence of proper drainage system

Pictures showing the adverse affect of lack of proper drainage.

Silipang-Logoda road:Drain gone wrong (Punakha)

Deorali-chisopani road:Drain gone wrong (Samtse)

Farm roads were provided with earthen drains which become practically useless during the summer with grasses growing around it and blocking the drains. However, there are some roads like the Gonpashingmo-Ngangmalam road in Pemagatshel provided with concrete drains by the DoR.

Gonpasingmo-Ngangmalam road (Pemagatshel): Concrete drain provided by DoR

Sankriti Bhukhey road:(Samtse)

3.6.3 Inadequate provision of culverts, drainage and other permanent works

It is important that permanent works like the provisions for culverts, drainage, retaining and breast walls, causeways and cross drainage facilities are provided to ensure that the road is not damaged by rivers and streams.

On site visit, it was observed that the conditions of the roads were very poor to the extent that commuting during the monsoon is practically impossible. The causes of such bad shaped roads were understood to have been the result of non provision of proper drainage, base course and other permanent works.

Causeway required Martsalla road (S/Jongkhar)

Need for retaining wall.Khagochen road (Dagana)

Therefore, the immediate requirement of maintenance and the monsoon restorations works were felt necessary for the infrastructures to deliver continued services and to provide value for money spent on these roads.

3.6.4 Quarrying and logging operations damaging the farm roads

Many instances of quarrying and logging operations in the farm roads and its vicinity were observed during site visit. The guidelines for farm roads, states that no logging or quarrying shall be operated in the farm roads or its vicinity.

Logging operations in Tinkerbi-Silambi farm road (Mongar)

Quary operation in Tashidingkha farm road (Trongsa)

However, as depicted in the photographs, these activities were carried out indicating the lack of compliance to the Guidelines. These operations were carried out in most of the cases as given in the **ANNEXURE XI**. Such activities could lead to serious damages to the farm road and the environment, resulting in huge maintenance burden to the government.

5 RECOMMENDATIONS

5.1 Proper planning and prioritization should be carried out

Proper planning and prioritization has to be carried out at the geog, Dzongkhag and ministerial level. With sixty four geogs still to be provided with motor-able road connectivity, it is important for the Ministry to prioritize the need for farm roads based on availability of existing connectivity, number of direct beneficiaries, potential agricultural productivity, etc. The Ministry should not accord priority on providing farm roads for households requiring less than a hour's walk, connecting roads for anticipated future use and for those that has easy access through alternative road. With government facing the problems of scarce resources, judicious use of resources should be done by assessing properly the requirement of roads and prioritizing it for remote and far flung areas. Such attempt would also help in reducing the disparity amongst villages and geogs.

5.2 Technical specifications of the guidelines should be followed

The farm roads should be constructed conforming to the provision of the new guidelines issued by the Ministry. It should be ensured that all farm roads fit into the Road Sector Master Plan and comply with the Road Act. The guidelines will help implementers in going about with the right technical and other specifications. The new guidelines even contain a maintenance manual which could be handy both for the Dzongkhag and the beneficiaries in keeping the road in proper condition.

5.3 Impact assessment of farm roads should be undertaken

Studies to establish the impact of farm roads should be carried out. A proper study into the benefits accrued from farm roads needs to be carried out. It is essential to know that the investments made by the government have yielded its intended results. It could also help in ascertaining the need for other activities like agriculture and horticulture promotion.

5.4 Dzongkhag engineers should be trained on road construction

The Ministry in association with other road constructing agencies should organize suitable training program for the Dzongkhag engineers. With most of the engineers having little or no knowledge of road construction, it is pertinent that some training on the road engineering is provided so that the implementers do not face problems of constructing quality roads.

5.5 MoA should look into possibilities of developing non-functional roads

The Ministry should relook for providing base course at critical and sharp turning of the farm roads for effective delivery of services. With huge investment on farm roads, it is paramount to ensure that it provides sustained services and does not turn out to be non-functional. Its sustainability can be ensured only by providing permanent structures, base-course works at high gradients and sharp curves. With as many as forty nine roads not functioning during the time of site visit by audit, the Ministry and Dzongkhags should look at providing maintenance budget to make good use of the investment. Construction of bridges in farm roads rendered non-functional due to lack of bridges should also be considered.

5.6 Farm roads should be handed over to the beneficiaries

The Ministry and Dzongkhags should ensure that the road constructed is properly handed over to the beneficiaries. To inculcate a sense of responsibility and ownership, all farm roads need to be handed over to the public in proper and formal manner. This will induce the beneficiaries in carrying out minor maintenance by themselves and in reporting the major blocks to the Dzongkhags. A system of voluntary road workers could also be introduced to enhance communication between the Dzongkhag and the road users.

5.7 EFRC should be followed while constructing farm roads

With the government putting so much emphasis on the preservation of environment, the damages caused by developmental activities should be reduced. Farm roads also need to be constructed in environment friendly manner. EFRC would aid to reduce environmental damages and future cost of maintenance.

5.8 Dzongkhag officials should conduct timely monitoring and supervision

The quality of construction should be monitored at the time of construction through close monitoring and supervision. The quality constructions would ensure the longevity of the infrastructure created and sustained provisions of its services. The Dzongkhags should explore solutions to keep the farm roads always open to traffic, especially during the harvesting seasons.

5.9 Farm Road Section of the Ministry should be strengthened

Considering the importance and size of funds allocated for construction of farm roads, the Farm Road section under the engineering division of the Department of Agriculture should be strengthened for effective implementation and monitoring of the farm roads program. It is also very important that the section keeps updated and accurate inventory of all farm roads for present and future use and reconcile the farm road data with the records of respective Dzongkhags to avoid inconsistencies in reporting.

5.10 Ministry and Dzongkhags should make judicious use of scarce resources

The Ministry should also be involved in determining the need for farm roads and where they should be provided so as to ensure that resources are allocated judiciously. Roads that neither connect production areas nor benefit the public should be avoided. Funds should also be prioritized for construction of farm roads for villages and geogs with potential agriculture productivity and those in far flung areas.

5.11 Very long roads could be upgraded into feeder roads

The Ministry could look into the possibilities of upgrading farm roads of more than 15 km in length to feeder roads. The length of these roads makes it difficult for the beneficiaries to carryout maintenance by themselves. These long roads do benefit a very large number of households and may, therefore, be accorded priority for up-gradation to feeder road.

5.12 Proper inventory of farm roads should be maintained

Since farm roads are assets created with huge investment, it would be necessary to maintain a central inventory of farm roads in the country. The information would provide fundamental inputs to the decision makers for easy monitoring, prioritization and equitable and judicious resource allocation in future. The inventory should contain details such as year of construction, cost, length, beneficiaries, funding agency, conditions, locations, etc.

5.13 Reasons for huge variations in cost of constructions of farm roads should be ascertained

Cost of construction of farm roads varied significantly across the country and within the same Dzongkhag also. While many farm roads were constructed at very reasonable costs, cost incurred in many others was exorbitantly high. The Ministry should, therefore, analyze the costs of construction of farm roads across the country and ascertain the reasons for variations for initiating cost control measures and benefitting from the experiences of each other. Such an analysis would also assist the Ministry to ascertain the methods and practices followed in various Dzongkhags and adopt a rationalized and cost effective approach in future farm road construction projects.

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