FORMULATION OF A FUNCTIONAL ROAD MAINTENANCE SYSTEM FOR THE NORTHERN PROVINCE

Submitted By:

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DECLARATION OF THE CANDIDATE

I do hereby declare that work described in this thesis was carried out by me under the supervision of Dr D.P.S. Chandrakumara and Mr.Prabath Jayantha and report on this thesis has not been submitted in whole or in part to any University or any other institution for another Degree/Diploma.

Date 20/03/2016 .....

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Thank you.

Author

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Contents

List of Figures

List of Tables

FORMULATION OF A FUNCTIONAL ROAD MAINTENANCE SYSTEM FOR THE NORTHERN PROVINCE

P.Arulnathan Roy

ABSTRACT

Infrastructure is an important prerequisite to create a strong economy and prosperity. Access to well-functioning Road Network is essential to promote trade from the local to regional, national and global markets. This is the fundamental basis for economic growth and sustainable development.

Therefore road network must be maintain periodically so this research provide the functional Maintance management system for Northern Province. However the Northern Provincial road Maintance approaches are very poor and they still depend on old methods and during the planning process Politician's intervention are misleading so our aim to avoid this issues and aim to develop a functional maintance system for Northern Province using GIS

This study is to investigate on how to improve a functional road maintenance management system using modern technology in order to reduce time and cost. The study is carried out field visit from the Northern Provincial Road network

This research briefly describe the important roads such as access to hospital, markets, schools, and high and low volume traffic roads so with in these data we have prioritize the road network using this social and economic impacts.so planners or engineers easy to identify their roads which is important or need to maintain.

This research provides the fundamental basis for the Road Maintenance Management System of the provincial road network. We believe this study is very helpful to Northern Province.

Keywords:

GIS, RMMS, Road Maintenance Management System, Roads, Road Management System, Pavement Management System

Abbreviations

C.Eng	**Chief Engineer**
E.Eng	**Executive Engineer**
NH	**National Highways**
NPRDD	**Northern Provincial Road Development Department**
PD	**Provincial Director**
RDA	**Road Development Authority**
RDD	**Road Development Department**
RMMS	**Road Maintenance Management System**
GIS	**Geographical Information System**

CHAPTER ONE

1.0 Introduction

This Research based on Northern Province Road Network. Northern Province is one of the nine provinces in Sri Lanka, The total land area is about 8,884 square Kilometres with a population of about 998 thousand inhabitants. The province is divided into five administrative districts namely; Jaffna, Kilinochchi, Mullaitivu, Vavuniya and Mannar. Agriculture is dominant but fisheries and civil works, become increasing important in the province. Today, tourism industry is also contributing in economic growth in the province. During almost three decades of long- drawn conflict, there have not been any considerable economic activities in the province. Today however, the province is gradually developing as a results from the governments various initiatives and, investments funded by donors in different sector.

For this research we have selected Northern Provincial Road Development Department roads. NPRDD is responsible for planning of maintenance- and rehabilitation of 2120 km provincial roads or about 20% of the total provincial Road Network. This road network is managed by five Districts within the Province.

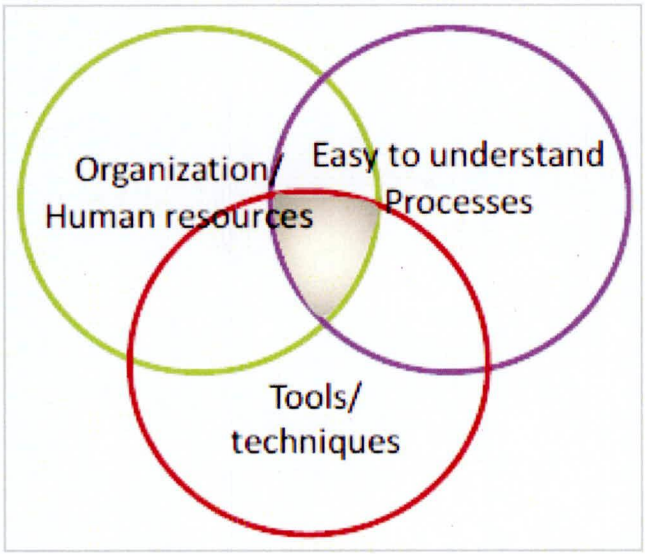
1.1Background

In 1989, the responsibility for the management of the Provincial Road Network was transferred from the Road Development Authority to Provincial Councils/Agencies. The nine Provincial Councils today, are together responsible for the management of a Road Network of about 15000 kilometers.

Decentralization of the responsibility of road management of local roads to local authorities is not a new phenomenon. It has been adopted in many countries with various degrees of success. The benefits are often expressed as effective road management, with the considerations of local condition and regional needs as well as better potential for realization of planned roadworks. However, decentralization in the most of the cases has faced many difficulties. The problem is often described by local authorities as insufficient funding for road- maintenance and improvement works.

Experiences however, have shown that the successful road management needs also skilled management organization, easy to understand processes and access to effective tools and technique. These together with a robust funding appear to form the fundamental basis for successful road management (see Figure 1).

Figure 1, important elements for successful maintenance and management



This Research intends to provide NPRDD, processes and tool necessary for effective maintenance planning of the provincial Road Network in Northern Province. Issues regarding organization and Human resource management are not covered in this Research.

1.2 The Problem

The main problem was identified that NPRDD don't have systematically approach for road maintenance system. They still depends on old methods and old methods are not a successful. So we believe a building a road maintenance system using GIS is very effective and easy to analysis a spatial data.

There for the study focus on Road Maintenance System using GIS.

Building a GIS based database it not easy and we need to define the criteria's, and define a methodology for data collections there for chapter 3 is describing about criteria's and methodology .

1.3 Objectives

The main objective of implementation of Road Maintenance Management System is to enable the NPRDD to effectively manage the provincial road network by using modern technique. The primary features for such a system are; storing- , structuring-, processing of data, and preparing reports for different planning purpose.

Specific Objectives

- Create Geo database for Northern Province roads.
- Create Road inventory database for NPRDD roads.
- Identify the road conditions.
- Identify a high volume traffic roads.
- Identify Social economic impact's

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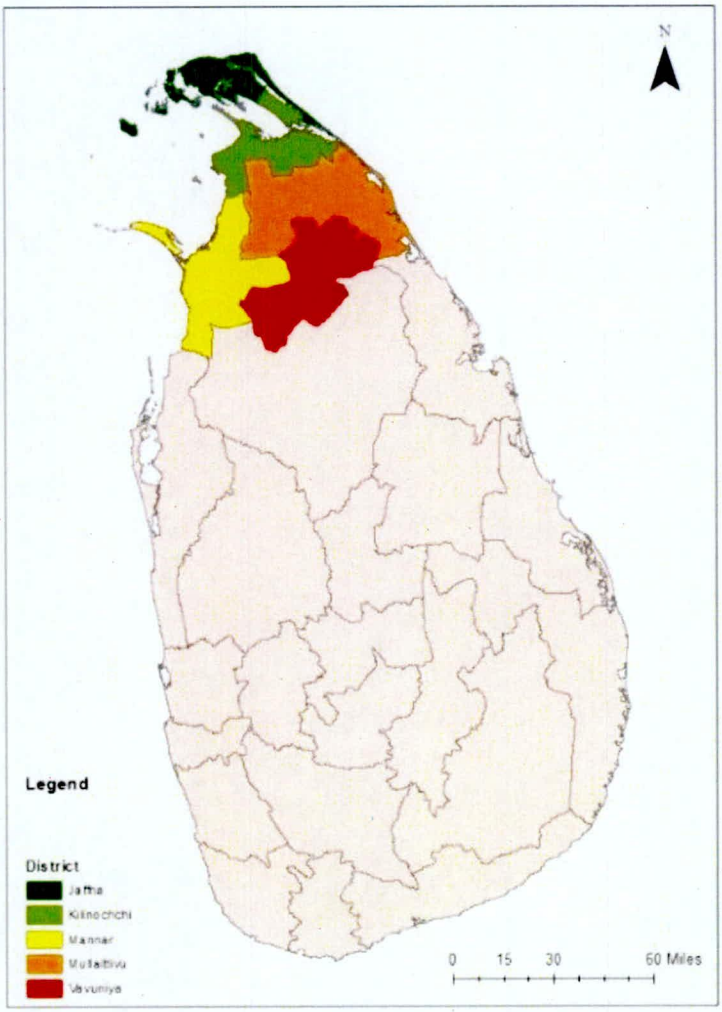
1.4 Limitations

1.4.1 Roads in Northern Province

Roads in general and provincial roads in particular play an essential role for the majority of people, living in villages in Northern Province. A large portion of people in rural areas are daily spending considerable time for travelling on roads to reach essential services such as hospitals, schools and markets.

Roads in Northern Province are narrow and severely deteriorated. There are no statistics on vehicle fleet but a description of the situation may be that the fleet is dominated by push bike, scooter and three wheelers. The vast majority of the people have limited mobility. Long standing war during the past decades, neglected maintenance, lack of official capacity and resources are often expressed as the reasons for this development.

Figure 2, Study Area

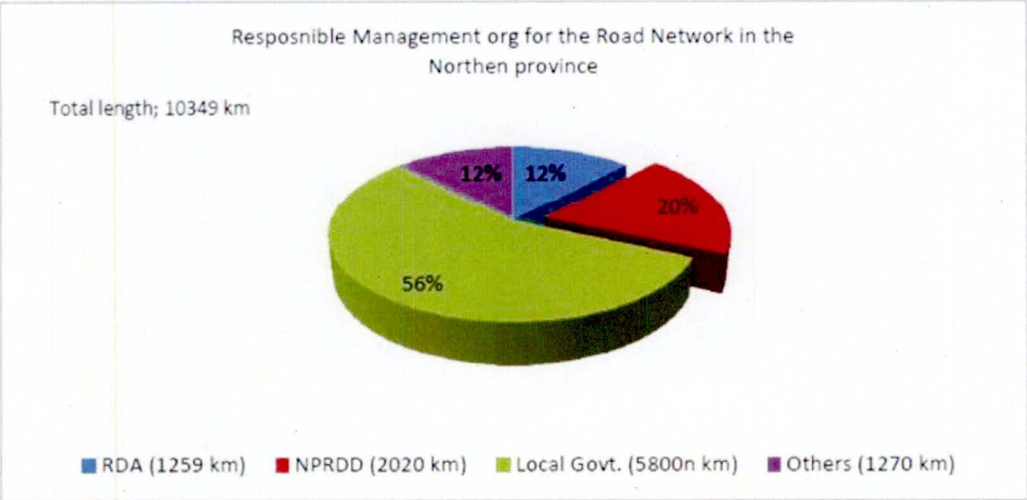


Source: Generated Based on Surveyor Department Data

1.4.2 Distribution and management of Roads in Northern Province.

The Road Network in Northern Province and the responsible authorities/agencies for management and planning of maintenance-/rehabilitation work are shown in Figure 3.

Figure 3, Distribution of responsibilities for the road network



Source: Generated Based on RDD Reports

NPRDD is responsible for planning of maintenance- and rehabilitation of 2020 km provincial roads or about 20% of the total provincial Road Network. This road network is managed by five Districts within the Province. The distribution of the road network in each district is presented in Table 1.

Table 1, the distribution of the road network in each district

District	Total KM	Classes		Type	
		C	D	Metal	Gravel
Jaffna	572	535	37	543	29
Killinochchi	280	254	26	143	137
Mullaitivu	412	392	20	112	300
Vavuniya	422	398	24	198	224
Mannar	334	306	28	168	166
Total Length KM	2020	1885	135	1164	856