DEVELOPMENT OF TRAFFIC SIGN ASSET MANAGEMENT SYSTEM IN INDIAN CONTEX

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ABSTRACT:-Asset management is a systematic process of maintaining, upgrading and operating assets. Several agencies are applying asset management principles as a business tool and model to help them define goals and prioritize agency resources in decision making. Road asset management is focused on bridges, traffic signs, pavement markings, culverts. This project focuses on the development of traffic sign asset management system. For this we have to conduct a visual night time inspection method to find the Retro-reflectivity of a sign. This survey will be conducted at regular night time intervals. This survey will be conducted at minimum vehicle distances with vehicle high beam lights. And some of traffic signs should be failed the test they should not visible to the driver. And some signs need for maintenance. The study findings indicate that making a business case for formal asset management programs. In the management study, we have to take manufacture cost of each sign and maintenance cost of the signs. For this we need to replace the some signs and maintenance should be required for some signs. And should note the latitude and longitude of the sign and create a file in the arc GIS and should plot a position of the each sign.

KEYWORDS: Asset management, traffic signs, management methods, arc GIS, cost analysis, Retro-reflectivity.

INTRODUCTION:

Asset management is defined as " A systematic process of maintaining, upgrading and operating assets, combining engineering principles with sound business practice and economic rationale, and providing tools to facilitate a more coordinated and flexible access to preparing the decisions necessary to reach the public's expectations". Assets of the road network as physical information such as roads and bridges, Equipment and the resources, Data, computer systems, methods and technology. Asset management systems is generally consists of Include the asset inventory, information and condition measures, Include the values of a condition of the asset, Include the performance of prediction capability, It also ensure that data integrity, enhance data accessibility and provide data compatibility, Include all the relevant components in the life-cycle cost analyses, Enable the removal of an out dated systems and unproductive assets also, reports were useful information on periodic basis, ideally in a real time, facilitate iterative analysis is a processes that can be performed on regular basis.

Integration is key aspect of asset management. This system delivers an integrated approach to all the costs, road user, works, administration, environmental and also public costs and the current data sources. This system integrates the current management system for single assets. This merger provides the road administrations with a consistent

system wide data, allowing the allocation of an available fund across competing pavements, structure and other infrastructure. An asset management system holds all processes, tools, data and also policies necessary to achieve the goal effectively managing the assets. Although the concept of "system" does not usually focused on data requirements, an effective approach to a managing the assets as an integrated system should include the data required to meet the asset management objectives.

This implies that in general, an AMS will consist of the following components goals and plans of organization, data, resources and also budget details, performance model for another strategies and program development, project selection criteria, implementation of program.

The road network creates one in each of the most important community assets and this predominately government closely-held. The agencies are liable for the transport infrastructure, maintain, operating, improve, replace and preserve this asset. At identical time the economic and human resources needed to achieve the performance objective of the road network and may be managed fastidiously. All carefully accomplished below the shut study of the final public World Health Organization get this a district of the transport system, area unit regular users of this place and increasingly demand improved levels of quality, in terms of safety, reliability and luxury, from the road network.

Roads and highways offer the dominant mode of land transportation. They kind the backbone of the economy, typically carrying over eighty per cent of passengers and over fifty per cent of freight in a very country, and providing essential links to large rural road networks. Roads square measure among the foremost necessary public assets in several countries. Enhancements to roads bring immediate and typically dramatic edges to communities through higher access to hospitals, schools, and markets, bigger comfort, speed, and safety; and lower vehicle in operation prices Governments is placing greater pressure on road administrations to improve the efficiency of roads and accountability for the management of community assets. In some of the countries like Canada, the United States and Australia face formal accountability and reporting requirements on how they manage their assets.

Objectives and scope to provide ready access to the database system, to develop the decision support system using the acquired data set for the asset management, to develop a support system to optimize use of assets,to utilize the principles of economics, accounting and customer service models.

II. LITRATURE RIVEW

Harris, E.A., Rasdorf et al describes the minimum traffic sign reflectivity standards. This paper was presented analysis of several traffic signs reflectivity maintenance methods using sign asset management. This method based on inspection and data collection process. The simulation part should be done. They should take 30 scenarios in the annual maintenance cost per sign and percentage of traffic signs. The simulation results should be higher cost per higher sign maintenance generally the resulted in a lower percentage of signs. For some signs using night time inspection method.

Petri Jusi et al describe the road network of Papua and New Guinea. This

country the total road network of 8258km of national classified roads and other 19937km low-traffic roads. The total cost of roads us 1billion dollars. In this country department of works (DOW) were maintaining the road assets. And this department doesn't give the sufficient attention to maintaining the road networks. And this should effect on the economic growth and gross domestic product. In this country to be able to provide a basic service to access, to markets, administrative, health and education. The poor maintenance of road network limits access to the rural population of basic services. Dow collects the funds and guidance by Asian development bank and with the assistance of Finland consultant and developed Road asset management system. This is a stirring and presenting road data information, short term and long term maintenance, budgets made for road networks.

Michael J. Markow was describing the asset management practices on pavement markings. They told that the principles and asset management by pavements and bridges. They should divide the six classes of non-pavement infrastructure assets from the NCHRP synthesis topic 37-03. Traffic signals, signing, lighting, pavement markings, culverts, sidewalks are the classes of asset management. They should review some of the aspects to approaching the asset maintenance, budgeting methods, measuring the asset performance, asset service life, material usage, technology. This study indicates the basic knowledge on pavement markings, management, and site conditions service life for different materials. And for some of the processes using the reflect meter for reliability, asset management approach.

MohdZulkifli etal was describing the road maintenance using the GIS applications and they should do a case study on Penang, Malaysia. In this paper they mainly considered development and economic process of a nation is closely associated with its available transportation system. Road transport infrastructure facilities can promote industrial and economic development. To provide safety and comfort to road users, road maintenance schedule must be formulated and adopted to ensure these roads are in good condition at all times. Preventive road maintenance works, like road rehabilitation will facilitate to reduce the main road repairs. Prior to this, a good database, gathered through GIS will be necessary in order to ensure maintenance is completed effectively.

Geographic information system (GIS) is said to be one of the useful tools that can be utilized to manage information in road maintenance engineering. GIS system is capable of storing, managing, analysing, computing and displaying all forms of geographical information for road maintenance works. In this study, they should adopt GIS application software – ArcView, and have reviewed and analysed its effectiveness in managing road data. This data are then used to assist the management to confirm effective and systematic road maintenance.

III. BASIC CONCEPT OF TRAFFIC SIGN ASSET MANAGEMENT

Traffic signs are an essential a half of the road system, and a road with poor signing or by poorly maintained signs are an insufficient road. Road users depend on traffic signing for information and guidance, and route authorities depend on signing for the

economical operation of the route network, the group action of traffic rules, traffic control and facilitate to road safety.Signs should offer road users their message clearly and at the right time. The message should be clear and quickly understood. A pattern normal sign assist in their quick recognition, as can regularity of form, colour and writing for every type. Induce the fullest advantages of uniformity there mustn't only be regularity of signs, however additionally regularity in their use, positioning and lighting.

Signs are provided to manage and guide traffic and to market road safety. They should only be used where they'll usefully serve these functions. On the other hand their omission where steering, and control or danger warrants a utilization of a sign isn't at the intervals the road users are best interest. A balance should be able achieved between too many and too few signs. Signs are only effective if signs should have visibility properties, signs should have legibility properties, signs should not be understandable, the road users to know what they mean, the road users is interested to behave correctly, types of traffic Signs, Regulatory Signs, Size of Regulatory Signs, Warning Signs, Size and siting of Warning Signs, Information Signs, Positioning of Signs,Position relative to the edge of the carriageway, Height and angle of the sign plate, Maintenance of Signs, Maintenance rules, Cleaning, Repairs**.**

IV. STUDY METHODOLGY

An asset management system in use by a road administration will utilize the following data definition of the system, definition of the benefits on the system, Location of the advantages on the system, Condition of the assets, Levels of utilization, Policies and measures (e.g. Support models and medication plans and additionally observing data, for example, execution measures), Budget data (e.g. Broken down by asset type, program level). The visual night time method uses human observers visually judge at a night time weather and observers should have some judgement on the reflectivity of signs. Generally it should be conducted at regular highway speeds from the travel lane using the low beam headlights. To measure retro reflectivity method uses a retroreflector meter to measure all signs. At least four retro reflectivity readings are taken during the daytime and the average retro reflectivity value of the sign is compared to the established minimums for that particular sign.

The expected sign life method calculates a sign life from the signs.it should be combination of sheet colour and sheet type.it should requires the tracking age of signs either by using the sign installation date labels on the back of each sign. The blanket replacement method replaces all signs along the corridor within an area. Replacement should be based on the manufacturer warranty. The control sign method uses signs either in a controlled study yard or a sample of signs from the field to determine sign life. The control sample of signs is used to represent all of the signs in an agency.

Asset management systems generally carry out the following data analyses Interpretation of the condition information gathered on the individual holdings, Identification of "ideal" medicines, Prioritization of upkeep medicines against plan, Prioritization of maintenance treatments against budgets. Holding administration for the most part looks at such components as venture levels, support norms and budgetary vitality. Regarding base administration, these variables may be interpreted into different measures of execution of the advantage, including level of utilization, wellbeing and ecological effect. Possession administration

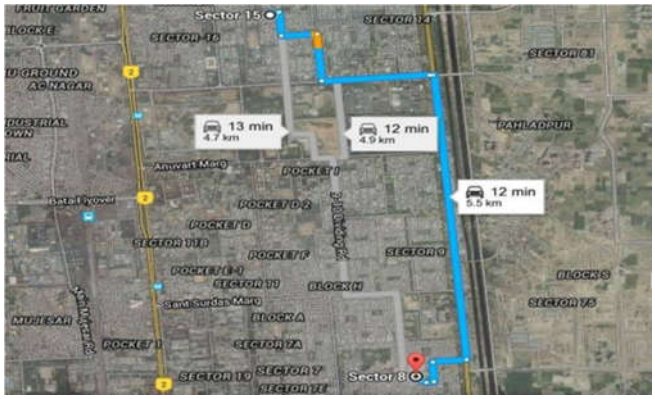
will hence be affected by topographical and socio-monetary circumstances in the association and the business methods received. The estimation of the benefits will be ascertained utilizing perceived and acknowledged bookkeeping practices. The calculation of the value of the asset is not generally included in management systems for individual assets.

Information investigation could be of a specialized, budgetary, or general nature and not every kind of dissection will be utilized similarly as a part of all levels of an association. All in all, distinctive parts of an association will complete information investigates at diverse levels of subtle element. The shows underneath cases of the sorts of information investigates did by a street organization and which may profit from the utilization of an advantage administration framework.

V. STUDY AREA AND DATA COLLECTION

The data collection should be taken on the ring road of the Vijayawada. This data should be taken from M G Road to Eluru road. Data collection of the signs and signals on the road by using inspection methods and using cameras.

The sign asset data was collected on the ring road from M G Road to Eluru road. This data was collected by using visual night time inspection method. This method was a visually judge the retro reflectivity of a sign. Retro reflectivity is the physical ability of the material to reflect the light back in the direction of the original light source (e.g. Vehicle headlight) normally at night. This test was conducted during night hours 7pm-9pm. The vehicle speed is the 40kmph and the visual inspection from the 100m distance from the sign. The vehicle head light was focused on the sign and it is reflecting light back is in the direction of the original light source. Some of the signs were not clearly visible and this type of signs should be replaced.



VI. SIGN INSPECTED RESULT

To find the coefficient of retroflection (Ra) values for each sign. The coefficient of retro reflection (Ra) is the ratio of the light which the sign reflects to a driver (cd) to the light which illuminates the sign (lx) per unit area (m2). By getting the Ra values we can find the observation angle, entrance angle. From these two angles we can find the coefficient of retroflection (Ra). Vehicle to sign distance is 100 meter sign height is 2.0 meter.

Table: Minimum Distances for Sign Visibility and Legibility

Speed (kmph)	Visibility (m)	Legibility (m)
40	90	55
50	100	55
60	150	70
70	170	70
80	185	70

Vehicle headlight distance from the road 0.65 meter driver sight distance is 1.2mts.from these distances can find the observation angles and entrance angles.First can find the observation angle and entrance angle for the visibility distance. These distances are based on the type of roadways and cities.

Using the right angle triangle method the observation angle and the entrance angle is found by using the lengths and heights measured during observations the angles are measured. The height of the sign under consideration taken as H, H1 is the height of the observer in the car from the ground, L1 is

the distance between the observer and the traffic sign, and H2 is the height of the headlights of the car from the ground, L2 is the distance between head lights of the car and the traffic sign.

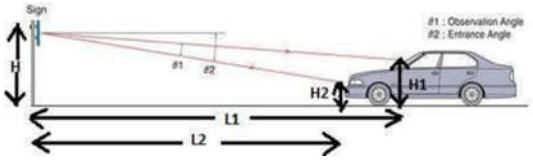


Table: Observation Angle and Entrance Angle for Visibility Distance

Speed (kmph)	Distance(m)	Observation angle (θ_1)	Entrance angle (θ_2)
40	90	0.37	0.87
50	100	0.33	0.78
60	150	0.22	0.52
70	170	0.20	0.46
80	185	0.18	0.42

The above table observation angle and entrance angle for visibility distance, this include speed, distance, observation angle and entrance angle. Speed variation of difference distance and find out the different reading of observation angle and entrance angle.

Table: Observation Angle and Entrance Angle for Legibility Distance

Speed (kmph)	Distance (m)	Observation angle (θ_1)	Entrance angle (θ_2)
40	55	0.62	1.45
50	55	0.62	1.45
60	70	0.48	1.13
70	70	0.48	1.13
80	70	0.48	1.13

The above table observation angle and entrance angle for legibility distance, this include speed, distance, observation angle and entrance angle. Speed variation of difference distance and find out the different reading of observation angle and entrance angle

Table: Retro-reflectivity Performance Standards

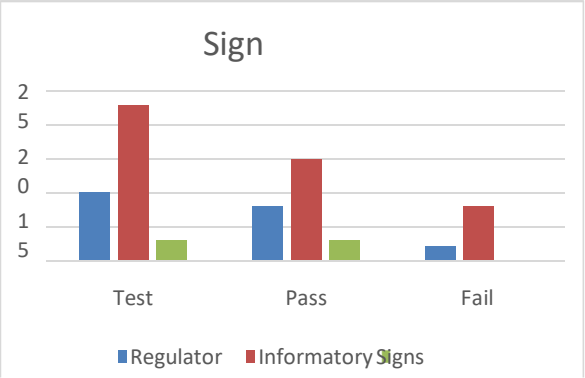
White	A = 342, R = 307
Yellow	A = 238, R = 212
Red	A = 67, R = 60
Blue	A = 17, R = 15

A= annual tests conducted if below, these values.
R= replacement considered below, these values.
In above table as per based on that standards some signs having the less retro-reflectivity standards. For that signs we can need replaced or maintenance the signs.

Table: Sign Inspected Data

	Regulatory Signs	Informatory Signs	Warning Signs
Tested	10	23	3
Passed	8	15	3
Failed	2	8	0
Failed (%)	20%	80%	0%

In above table have sign inspected data, the sign inspected and compare these with the retro-reflective standards. The signs failed at the night time inspection methods using the legibility and visibility sight distances. These observations are compared with the AASHTO specifications and there is a minor percentage of error, so these values are reliable for the further analysis of the study.



The above graph there are presented sign inspected data which are regularly sign, informatory sign and warning sign. They sign used in practical and find the result how much sign are tested for all signs, and how much sign are passed in total signs.

Figure: Sign Asset Data in GIS

In above figure Steps followed in arc GIS: Get the latitude and longitude in an excel sheet, import the excel sheet to arc GIS, define the x and y values in arc GIS, Then the point of features opened in the arc GIS, Convert the point features into a layer feature using the arc GIS tool, then convert the layer to (km) format for viewing the layer file in Google earth, open Google earth and import the (km) file to open in Google earth.

Table: Sizes of Collected Signs Data

S. N.	Signs Type	No. of Signs	Dia. Of signs (mm)	Sheet Type
1	Maximum Speed (40kmph)	5	600	Engineering Grade
2	Speed Breaker	1	600	Engineering Grade
3	Major Road Ahead	2	600	Engineering Grade
4	No Parking	3	600	Engineering Grade
5	Informatory	23	450	Engineering Grade

In above table have size of collected sign data, they signs are the different type of different place where uses. The find out the different signs have different size of different grade, the sign have different number of different places as per utilization.

Table: Approximate Manufacture Costs of Signs

S.N.	Signs Type	Manufacture Cost (INR)	Maintenance Cost (INR)	Total Cost (INR)
1	Maximum Speed (40kmph)	1010 x 5	Individual sign crew worker wage/total Number of signs.	5050
2	Speed Breaker	510 x 1		510
3	Major Road Ahead	510 x 2		1020
4	No Parking	1140 x 3		3420
5	Informatory	760 x 23		17480

The cost of the regulatory sign is the INR 1010 and no of signs should be 5 and speed beaker sign cost INR 510 and two major road ahead signs with the cost of 510. No parking sign should be INR 1140inr total 3 signs. And 23 more number of informatory signs each sign cost is 760. Then the total manufacture cost of the total signs is INR 27480. And the maintenance cost should be included in the management methods (daily wages, paintings, repairs) for all this the minimum maintained cost per year INR 250 per sign approximately. We have to maintain 33 signs the total cost should be 8250 per year. To maintain should be twice in a year. The total cost of the signs was INR 35730.these values are based on the population and traffic volume and market prices. These costs are changes year by year

VII. CONCLUSION

The goal of analysing the asset management of traffic signs. Can minimize sign asset costs while maintaining a high level of safety on local and state roads. These observations are compared with the AASHTO specifications and there is a minor percentage of error, so these values are reliable for the further analysis of the study. In my study around 75% of the signs are visibility and legibility properties are according to the standards. Some of the regulatory signs need to be changed because the reflectivity of signs is less and maintenance should be required for 3 signs. Some of The informatory signs should be re replaced because the directions of the signs not visible from a certain distance. Parking signs should be visible from all the distances and angles. Manufacture cost and maintenance cost for all the signs is estimated. These costs should be changed year by year and this should be based on the population, traffic volume and market prices.

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