Transportation system management and operation: A Review

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Abstract- *Transportation system management (TSM) techniques, which are generally low-cost and designed to max. Efficiency of existing transportation system, reduce travel demand and dependence of single occupants vehicle, reduce need for new and expensive transportation infrastructure. Therefore it is essential on to study and analyse different transportation system management and operations (TSMO) strategies. The aim of this paper is to review the relevant literature that published from 2010 to 2015 on topics related to TSM within the various areas. By studying 32 research papers, focused on TSMO strategies, like increase safety by taken attention to operational strategies, such as driver education, speed enforcement & pedestrian safety. Also Increase security by improving communication & coordination between transportation agencies & law enforcement. To study various techniques necessary for road accident minimisation and develop TSM action plan for traffic planners.*

Keywords:- Transportation system management (TSM), TSMO, safety, mobility, demand, social effects, awareness.

I. INTRODUCTION

Transportation system management is one of the planning tool necessary for reduce traffic congestion in urban area. Such tool necessary for applying various strategies and operations. There are maximise efficiency by reducing impact occurs on existing traffic system. It is subset of supply chain management supply chain management concerning transportation operations and may be part of an enterprise resource planning system. Such system provide innovative services relating to different modes of transport and traffic management and enable various users to be better informed and make safer, more coordinated, and 'smarter' use of transport networks. Due to development of TSM action plan for planners for any urban area useful for give guidelines to them for mitigation process.

The objectives of the proposed work: To study TSMO strategies for transportation system implementation. To develop TSM action plan for traffic planners.

1.1. Historical development :

Transportation system management has a long history; rapidly increasing congestion, constraints on capacity expansion and limited financial resources nationally and locally, are causing concern for transportation agencies and their customers. The Pikes Peak Region metropolitan transportation planning process has traditionally focused on constructing new roadways and widening existing highways; however, current challenges associated with transportation system reliability, safety, and security now require developing new methodical strategies to improve operations of the existing system.

The Federal Highway Administration defines Transportation Systems Management and Operations (TSM&O) as "an integrated program to optimize the performance of existing multimodal infrastructure through implementation of systems, services, and projects to preserve capacity and improve the security, safety, and reliability of our transportation system. “In simpler terms, TSM&O is a program based on measuring performance, actively managing the multimodal transportation network, and delivering positive safety and mobility outcomes to the travelling public in Florida.

Realizing the potential benefits of adopting this program, on May 20, 2010, the Florida Department of Transportation (FDOT) Executive Board endorsed the working definition of TSM&O, the TSM&O Business Plan, and the outline of a Strategic Plan. The application of TSM&O has the potential of positively affecting many different areas and programs within the FDOT. Areas such as work zone management, freight management, freeway and arterial management, and transit operations and management stand to benefit from this program.

1.2. Working Principle

This approach focuses on both short-term and long-term system performance, using established system performance measures rather than simply focusing on implementation of projects as a measure of success. It can be applied to both metropolitan and statewide transportation planning processes. The approach emphasizes consensus and collaboration across modes and jurisdictions and between

planners and operators to help ensure that regional transportation investment decisions reflect the consideration of available strategies and approaches to meet a region's transportation goals and objectives.

An objectives-driven, performance-based approach to planning for operations is based on the concept that "what gets measured gets managed." Investments are made with a focus on their contribution to meeting regionally agreed-upon objectives. By implementing this approach, resources are allocated more effectively to meet performance objectives, resulting in improved transportation system performance.

1.3. TSMO process and process parameters:

Transportation system management and operation process based on the some following parameters shown in Fig. 1

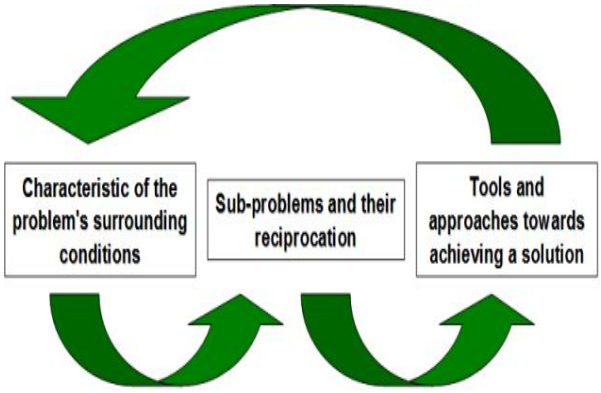

Fig. 1 Process parameters of TSMO

1.3.1. Characteristics of the problem's surrounding conditions:

The issue of congestion is likely to remain as one of great ongoing issues in transport because there are unprecedented demands for transportation being generated by a global economy that is ever more dependent upon the transport industry. The causes of congestion are well understood, even if the solutions are not. Congestion occurs across modes and locations and arises from two causes. Most important is when demand for mobility exceeds the capacity so support it. It can also occur when random events bring about a temporary disruption to service, such as an accident or a natural hazard such as flooding. In the case of the second set of causes, it is possible to mitigate their effects if the occurrence is frequent, such as accidents, or if the risks are great, as for example of flooding in a flood plain. Regardless of the specific solutions to congestion that are considered, increasing demand is placing unprecedented requests for investments on transport infrastructures. A major question confronting all countries around the world is how to finance the construction and maintenance of transport infrastructures.

1.3.2. Sub-problems and their reciprocation:

At the time of development of TSM system there are challenges occurs due to the miscommunication, improper coordination, insufficient funding. So it is necessary for work on to increase efficiency of transport system.

1.3.3. Tools and approaches towards achieving a solution:

Telecommuting, compressed work weeks, and flexible work hours are employment based techniques to reduce the number of work trips per week, or to transfer trips to reduce peak hour congestion. Telecommuting, or alternative work location, allows workers to perform job duties at home or another location, communicating with the main work center by modem, fax, or telephone as necessary. This alternative is especially attractive for workers in rural areas or those commuting long distances, and studies have shown telecommuters are up to 20% more productive.

The EC time is another significant parameter that is influential on the electrocoagulation process. Treatment timeor electric charge added per volume is proportional to the amount of coagulants produced in the EC system and other reactions taking place in the system.Because the formation and concentrations of metal hydroxides play an important role on pollutant (COD, turbidity and phosphorus) removal, this depends on operation time[6,8].

II. TRANSPORTATION SYSTEM MANAGEMENT

The emerging policy on Urban Transportation Planning issue is the newly promulgated TRANSPORTATION SYSTEM MANAGEMENT (TSM) action programme. It is now required that TSM projects be included in the TRANSPORTATION IMPROVEMENT PROGRAM (TIP) as the short range element of the overall plan. Generally all cities 2lakhs exceeding in population these TSM plans are compulsory while preparing comprehensive transportation plans. The TSM considers a wide range of actions with low capital investment requirements that can improve the transportation service in the short term. It reflects the

1. Steeply rising costs
2. Environmental concerns
3. Intense competition for available resources

And make it imperative that better and more efficient uses for existing investment in the transportation infrastructure

be found before additional investments are made in costly new facilities. The new concept is therefore to make more efficient use of the highways and transit system already in place thus reducing the need for new capital investments and for operating assistance.

The TSM on implementation provides the following advantages:

1) Fiscal economy
2) Better balance among the various elements of urban Transportation System
3) Broader local and national goals of energy conservation
4) Environmental improvements
5) Equity for transit dependents
6) Urban preservation

The aim of this work was to accomplish this, and based on the literature, to present an overview of practical optimum operation times, current intensities, Time consumption, and operating costs in a wide and versatile range of feasible applications of TSMO in various cities villages, studied mainly during the years 2010- 2015.

III. CONCLUSION

This paper has given a review of the successfully TSMO application, for the removal of specific problematic factors (such as Traffic congestion and accident) that cannot be removed effectively via operational methods. TSMO has great potential in improve current TSM and seems to be a feasible and economical alternative in this field, although more research is needed, especially using larger-scale and/or continuous systems and focusing on the fundamentals of the TSM process. It examines, TSM, a method for improving productivity of existing transportation system and operation that use them.

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