

Fleet Management for Construction Site in Mumbai Area with Mobile Application – A Review

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Abstract: Construction is a rapidly growing industry all over the world. In India this growth was rapid in last two decades, but as compare to its use of advance technology as mobile application in construction industry it still lacks at some areas and especially in term of fleet management. Big Giants of Construction industries use advance fleet management software, but medium scale and small scale are not able to afford such costly software. In this dissertation we have proposed to design such a model for fleet management so that it can be affordable for everyone. Study is set are objectives to understand the lacunas of fleet management in few construction site in Pune and Mumbai area. Fleet management is to broadly studied based on its categorized and usage at a site. After careful analyzation we have come to important factors which can help to improve the existing model of fleet management at small to medium scale construction site further plan is to use the analysis for designing of a mobile application by using the critical factors of fleet management which we have got through the study over it. Mobile application will easily use at construction site for fleet management from skilled labor to site engineer and to further in the management hierarchy.

Keywords: Fleet management, small scale medium scale, Mumbai, Pune, Mobile Application.

1. Introduction

There are many function through which a construction firm achieves its objective of completing any project. Functions' like planning, organization, coordination, execution or implementation. One of the critical point in planning is of vehicle routing and scheduling which can be closely related to fleet management. Vehicles take a very important part in construction, loading unloading of materials like brick, steel, concrete through RMC trucks etc. In construction sector vehicles has to Construction in Mumbai is been rapidly developing in last 4 decades. Commercialization in Mumbai has attracted a lot of people for employment and residential. Due to shortage of land in Mumbai vertical growth has taken a toll which has increased the challenge of the builders to have advance technology for construction. Next is the traffic problem related to the traffic through which the fleet/vehicles has to route to that construction site with the material?

A. Objective of the research

1. To study the existing situation of fleet management both on and off site of construction.
2. To study the obstacles related to traffic during routing of materials from production to the site of construction.
3. To proposed a model and create a mobile application for smooth conduction of Construction operation.

B. Scope of study

The study will investigates the monitoring of the routes and management of vehicle which are used for material hauling and all other purposes. Investigation regarding obstacles in traffic are to be studied based on different traffic monitoring pattern study. Mumbai Case studies are been taken consideration for the fact that Mumbai has a lot of construction work and a lot of traffic problem. These paper takes Nerul and nearby area in Navi Mumbai.

C. Literature Review

Construction Equipment Fleet Management Using Telematics Technology: Research and Resultant Educational Perspectives, Erdogan Sener, Indiana University-Purdue University, Indianapolis, D. Tom Iseley, Indiana University-Purdue University, Indianapolis American Society for Engineering Education, 2009.

Use of the telematics technology has the capability to enhance constructions equipment fleet management to a whole new level. This paper focuses on a recent collaborative research undertaking to find more about the details of this technology and its impact so far on equipment fleet management. The purpose of the research was to evaluate the use of this technology in construction companies, determine its user acceptance, and to assess the differences it was making in fleet management. The difference made was to be assessed in terms of how this new technology had changed spatial equipment tracking, equipment utilization, equipment maintenance scheduling, operations analysis, job costing, and jobsite/project management related to construction equipment. The paper presents the results in terms of the details of the technology, the methodology of the research, the results of the evaluation, and

the conclusions thereof for the purpose of disseminating such information for the benefit of the construction management educators and the construction industry, as well as, elaborating on how this work is finding its way into the classroom for the benefit of the tomorrow's construction managers.

Construction Equipment Fleet Management, Sujay Dandwate, Col. B. K. Bhonde, Smita V. Pataskar,

As the array of useful equipment expand, the importance of careful planning and execution of construction equipment's increases. The objective of the project is to predict the fleet production rate and to optimize the number and size of equipment's in the fleet to match the equipment to project situations. Equipment economics is taken into consideration for the optimization. Observation is done on the actual ongoing highway construction project Fleet performance of practiced fleet is compared with optimized fleet with respect to cost, equipment idle period per cycle and productivity. The project concludes that the performance of fleet is enhanced through optimization of equipment in the fleet. There is lack of effective management of construction equipment's even though large capital investments are made in procurement and operation of the equipment. The cost of construction equipment involved in a project may sometime exceed the cost of the project. Ineffective management of equipment leads to loss in production, delayed production and hence leads to reduced overall profitability of the firm.

IoT Fleet Management market to Capture Unparalleled Growth with CAGR of 21.26%, from 2016 to 2021,

Routing management accounted for the largest share of the IoT fleet management market, by solutions. The growth of this segment can be attributed to rising global road freight traffic and constant R&D activities to develop innovative products. According to the Road Freight Transport Statistics of European Commission (EC), the road freight transport of European countries increased by 2.2% in 2015, as compared to 2014, and was the highest in the last five years. Also, the continuous R&D activities by fleet solution providers to develop advanced products help the fleet companies to provide the shortest and less crowded route to fleet vehicles to avoid unnecessary overtime cost.

Construction equipment fleet management: Case study of highway construction project, Saurabh Rajendra Kadam, Dhananjay S. Patil.

Construction Equipment fleet management at its basic level addresses the problem of managing fleets of various construction equipment's stationary as well as mobile such as dumpers, excavators, shovels, scrapers, belt conveying systems, graders, pavers, rollers, cranes, HMA plant, RMC plant, transit mixers, etc. Use of Equipment fleet management increases the productivity of overall site and increases the profitability through a proper equipment selection & optimization, production monitoring, tracking of equipment's, maintaining a maintenance schedule, etc. Use of various

sophisticated tools & techniques can be used for the same such as the telematics, GPS navigation, information transmission systems & various software's.

Using Fleet Management to Make and Save Money, William G. Wenzel.

Fuel savings via GPS tracking to monitor idling, speed, and other vehicle performance metrics that affect fuel consumption Productivity improvements with route optimization tools to ensure the fleet is deployed optimally for appointments and deliveries across the service area. Better driver accountability with GPS tracking and geo-fencing tools to ensure drivers are taking direct routes, not using company vehicles and time for personal use, or using the vehicles in an unsafe manner. Extending the life of a fleet vehicle with automatic repair/maintenance alerts that identify when vehicles are coming up for scheduled maintenance or are malfunctioning or out of compliance with established company policies so smaller, preventative repairs can be done before major, costly repairs are needed.

2. Material and methods (Data from Construction Site)

Methodology adopted for the above objectives are given below:

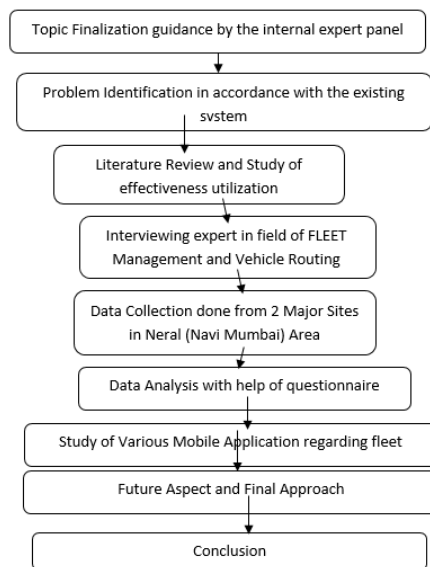


Fig. 1. Methodology of dissertation

For these research work we are going to shortlist specific vehicles like RMC truck and study with help of node, arcs and Tracks.

Classification of Routing and Scheduling Problems.

Case 1: Traveling Salesman Problem (TSP) is the simplest case where the nodes have no precedence relationship, travel costs between two nodes are the same regardless of the direction traveled; no delivery time restrictions. If relate to the RMC Route we can understand that here the depot remains the same and distribution center may be same or different at times.

Case 2: Multiple Traveling Salesman Problem (MTSP) is an extension of the TSP used when a fleet of vehicles have to be

Table 1
 Distance Time Site Matrix developed for this research

	RMC TRUCK		Bricks		Steels		Miscellaneous (Electric/Plumbing/tiles)		Remarks
	Dist.	Time	Dist.	Time	Dist.	Time	Dist.	Time	
Site 1/Node 1	3 km	15m	2.5 km	15m	2.5 km	20m	2.7 km	25 m	
Site 2/Node 2	2.8 km	20m	4.3km	20m	6 km	45 m	2 km	30 m	
Site3/Node 3	3.2 km	15m	2.2km	17m	4 km	14m	2.8 km	20 m	
Site4/Node 4	2.5 km	25m	2.5 km	22 m	2.6 km	20m	2.4 km	20 m	
Site 5 /Node 5	3.3 km	15m	2.7 km	35 m	3 km	20m	2.4km	30 m	

routed from a single depot. A set of routes are generated, one for each vehicle in the fleet. If we relate it to the RMC we can say that set of route for different truck from a single distribution center i.e RMC Plant to the construction site A node is assigned to only one vehicle; A vehicle will have more than one node assigned to it.

Case 3: *Vehicle Routing Problem (VRP)* is a MTSP with capacity restriction of the multiple vehicles coupled with varying demands at each node. It is an important problem in the fields of transportation, distribution and logistics. The Relation to RMC Truck is that truck of different capacity are enrooted on same or different route. Several variations and specializations of the vehicle routing problem exist like VRP problems having time windows within which the deliveries must be made and VRP with limited carrying capacity of vehicles.

Case 4: *Chinese Postman Problem (CPP)* is a special case where the demand for the service occurs on the arcs rather than at the nodes. Examples include street sweeping, snow removal, refuse collection, postal delivery and paper delivery. Relation to the truck problem is when the RMC truck has not to deliver at the node or site but on the arch.

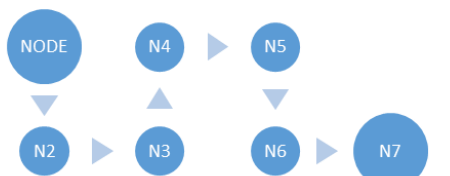


Fig. 2. Case 1, 2: Node (Circle)and Arch (Delta Sign)

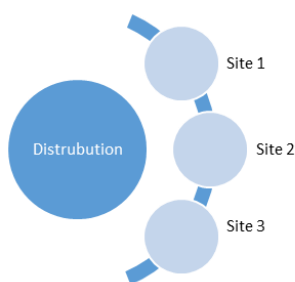


Fig. 3. Case 3: Centre and activity occurring at arc

Solution is to be provided in term of using to two techniques.

Nearest Neighbor Procedure (NNP) builds a tour based on the cost or distance of traveling from the last-visited node to the closest node in the network. IT uses distance Matrix study to understand the distance logic and time utilize to reach the

station. This type of Sheets is prepared and with help of Site supervisor and labors and materials manage at the construction site and are filled with remark at the end which includes their view about traffic. Drivers of this vehicles are also interviewed for their understanding about the traffic in Navi Mumbai and area around.

Case Study 1
Project Name:
Firm Name:
Project Type
Site Address:
Fleet used if Specialized or general

Case Study 2
Project Name:
Firm Name:
Project Type:
Site Address:
Fleet used if Specialized or general

3. Results and analysis

After data collection it will be easy for us to understand what are the different reason behind these delays in the fleets so that they can cause penalties and ultimate loss at site for further works. With one data site collection we can assume that the delays in 5 minutes will cost at some percentage of the penalty. As it is a review paper still the analysis to be taken is not clear Deigning a mobile application for the same will reduce the time.

4. Conclusion

As it is a review paper and the research is ongoing till date but we can promise to have a better and suitable Mobile Application for fleet management in Mumbai region for Builders who cannot afford to have costly Construction Management Software. It will also be a suitable alternative for other builders who use GPS and other technology for Fleet Management which take a lot of amount for project value.

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