

# Vehicle Tracking System using Technological support for Effective Management in Public Transportation

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## Abstract

With the modern converting public control approach, it's supposed for public establishments to provide greater green and powerful offerings at a decrease cost. In this study, the overall performance enhancement volume becomes found according to the decided general performance standards of transportation offerings statistics technology in public establishments. The institution's modern-day overall performance becomes evaluated. It has become obtrusive that public transport corporations (BRTC) wished for a statistics gadget to preserve car fleets below control. The effect of the car control utility becomes repeated that performance of the overall performance evaluation made above. It became decided where becomes obtained at minimum decreasing mentioned all types of expenses in public transportation.

**Keywords**— Vehicle Tracking System, Management Information System, Performance criteria, Transportation, Bangladesh, BRTC Bus Service, Information Technology.

## 1. Introduction

In modern years, 'the attention for an effective and efficient authorities' technique has caused public organizations to run. The evaluation that the government took movement is gradual and useful resource utilization is inefficient has discovered the need of a metamorphosis inside general management. Following the transmutation of a government department in the latest years, data generation has obtained practiced for public assets

efficiently and economically in step with supposed purposes. However, there isn't enough research to measure the literature's overall performance effect and IT use in public administration's corporations. In this concept, 'this has a look at is taken into evidence to happen a possibility for brand spanking new research.' During the previous 10 years, the general public zone has grown rapidly in conjunction with the populace boom. According to 'IHS institution Insight's 2019 have a look at, while the rate of IT

investment to the whole public expenditure is 3.2% with inside the USA -the chief of IT investments- this ratio is 0.3% in us of an among the benefit of using IIA Report (2019).'

IT performs an important purpose with enhancing performance and effectiveness in general management in numerous methods using NASCIO (Aydin et al., 2015) Firstly, IT automates duties that want a guide and extensive labor, procurement, and human experts' management. In addition, giant uses of contemporary quality of computerization public organizations and individual sources that come at the side of the spreading of IT facilitates the expenditure of an enormous amount.

Therefore, the choice makers' desire to determine whether or not big IT disbursements improve public institutions' performances has arisen. Secondly, Information technology gives numerous records concerning public employees and residents' public administration. During these circumstances, only a few experimental research is associated with explaining the fee of IT or the support of evidence in public establishments with the aid of using (Pang et al., n.d.). Improvements of modern signs recovered with the assistance of using overall performance opinions made inside the group are the various number one goals of the organization. Within this scope, techniques consisting of fine management, improvement imposing new technologies, enhancing crew work, true governance, and gov precautions may be cited regarding overall performance enhancement with the aid of using (Holzer & Yang, 2016)

With the growing technology era, building control operations more complicated, using the latest technological opportunities a good way to offer a powerful provider with documents structures could be inevitable. Besides this, in current years, modern technology has originated for use correctly via certified employees' employment. Consequently, the reconfiguration of public group records technology has added the idea of general management according to social and technological traits past conventional paperwork through (Jimoh et al., 2020). The survey

withinside the context of this looks at changes to make certain a growth withinside the overall appearance values withinside the group withinside the following new IT and application. Nowadays, greater companies are wearing their software program from PC systems to online circumstances. Government corporations should be made vital development concerning the usage of this online program. The thing regarding the complex control methods that survive out is the control of government group motors. That boom withinside various engines and expenses during the latest ages has proven that during phrases of huge-scale companies, becoming a powerful automobile monitoring and control data device for motors for use greater effectively is of essential importance. Other sides, the entity is no analysis was prepared about green car monitoring and control data structures in public establishments have recommended us (Huk & Kurowski, 2021). Also, having the research carried out consistent with the strategic targets decided via the system of means of the group employees becomes gained it used a good deal greater effective than the device so that its order be installed via the method of taking the distinctiveness bundle car monitoring structures. In these circumstances, with car monitoring and controller data gadget, a thorough alternate in sketches policies inside the organization, and precautions and time and price financial savings attributable to new era programs will ensure the group portraits greater effective and effective. To the degree of the volume of the effect, the overall performance standards implemented to the prevailing gadget become as compared via path of means of reassessment.

## **2. Literature Review and Hypothesis**

First, confirm that you have the correct template for your Recently the Public transport management system is continuously improving along with the expansion of our countryside. Still, often a bureaucratic policy issues with government transport corporations that produce unpredictable. As a result,

issues including incapacity, rising expenses, incompetence have begun to appear. Inside and outside auditing during Bangladesh has carried out some distance from the overall performance auditing concept. Bangladesh Road Transport Corporation, which means called BRTC, became hooked up in 1961. According to Wikipedia, BRTC became hooked up on the 4th February of 1961. That's earlier than our independence. In that method, the BRTC bus carrier is walking from the Pakistani era. BRTC became inaugurated using M.N Huda, who became the finance minister of East Pakistan in 1961. And because then, BRTC is walking efficiently in impartial Bangladesh until today.

IT has three individual roles in Transport Corporation recorded under computerization, exposure, and transmutation by (Vigneshwaran et al., 2020). The primary performance, transmutation, is to achieve business methods mechanically while not victimization staffing. The speech act is for the call manufacturers to use the information managed by the data technology infrastructure and have the general public learn of this information.

From the recent surveys taken by the Updated Strategic Transport Plan, it's seen that over 60% of the travelers use conveyance for their journey to work. The systems vie with one another for the patronage of the traveling public largely with low customary and non-current equipment and on the roads that are badly surfaced, inflicting further damage on the vehicles. The rise of the many homeowners operating single vehicles instead of larger corporations or organizations operating travel could hinder an established passenger-oriented system. Those unfavorable conditions seriously impact public transportation services, making them ineffective, suffering, and unpredictable. 'What's essential is the undeniable fact that several units traveling by are full and waiting for passengers' seat board?' According to (Urban Transport Policy, 2018).

According (Nivaan et al., n.d.), 'has indicated a nice carrier dimension the usage of an overall performance assessment device while comparing the

effectiveness of sports produced through the government. Therefore, the speculation supports in the range of this observe is: "IT has a tremendous contribution to the overall performance boom in the public delivery corporation." (Farzana et al., 2020). Bus tracking and observation are among the most issues within the government transport division (Ahasan & Kabir, 2019)(Curtis & James, 2004). Bus tracking and portable monitoring tools can be structured working smartcard-based price record modules for dealing goals (Camargo Pérez et al., 2015). The bus sequence of arrival is typically calculable of the rider's trip time at the location. The insufficiency of information seats provides challenges in determining these bus entrance periods (Jimoh et al., 2020). Various researches have explained the dilemma of managing IoT in bus transport method, while the design about optimization constraints managing 'RFID and other tech' correlated to IOT, method execution investigation, an advantage of wire, and sensor channels (Bahrami et al., 2021).

Sl.N o	Bus Model	Running Bus	Heavy Repair	Tot al
1	Volvo Double Decker	10	40	50
2	Ashok Leyland Double Bus	109	20	129
3	TC Bus-1316/55	284	31	315
4	Mini Bus	8	3	11
5	CNG Bus (FAW China)	20	4	24
6	China CNG Bus	243	-	243
7	Korean CNG Bus	253	-	253
8	Different Model Old Buses	46	45	91
Total Bus		973	145	1116

Source: BRTC (2020)

The whole Bangladesh route is traveling BRTC bus to using as a public transportation service. According to BRTC (2020) statistics, a total of 1835 buses and 588 trucks service existing in Bangladesh road at the same time number of the running bus 1450 and trucks 570 and heavy repair bus number is 145 and trucks number is 570.'





Figure:1 Study Area (Bangladesh)

In this research, to judge this operative performance, the purpose of the above-named criteria was assured. During this research, notwithstanding, because of performance criteria not being discovered among the strategic action plan, the factors were determined due to interviews with institution employees. Accordingly, twelve performance criteria were collected underneath the labor, cost, and repair (Table 1.). In this study transportation corporation performance criteria, proposed as a hypotrophies. On discussion part will be tested using others analyzed.

### 3. Methodology

The study area is the Bangladesh Road Transportation Corporation (BRTC) in Bangladesh. Which is one of the largest public transportation corporations in Bangladesh and the transportation area whole of Bangladesh (Figure: 1). BRTC is a government transportation corporation that maintains traveling activates in 64 districts in Bangladesh (Figure: 1).

Transportation assistance is in the care of the maintenance expenses and repair of more than 250 (Per day) vehicles, including 160 buses and 90 trucks. Nevertheless, the coordinating services segment performs the vehicle administration method systematically without practicing any IT.

In these studies, all of performance criteria data have collected from government BRTA websites and different journal statistics report.



FIGURE:2 THE LOCATION OF BANGLADESH

The segment, as mentioned previously, will describe how to enhance the gadget after revealing the current gadget method and outline the employer's overall achievement standards. In this context, the device must also plan to manipulate orderly to broaden a greater green gadget because the supposed gadget is a statistics contraption. System enhancement lifestyle cycle is used to prepare gadget enhancement systematically. Waterfall version, which rotated into recommended in 1970 via of means of Royce has used a method version for the term of software program enhancement method because of having comprehensive levels, and on the related time, best necessitates are greater vital in length among value range and time constraints (Figure. 3).

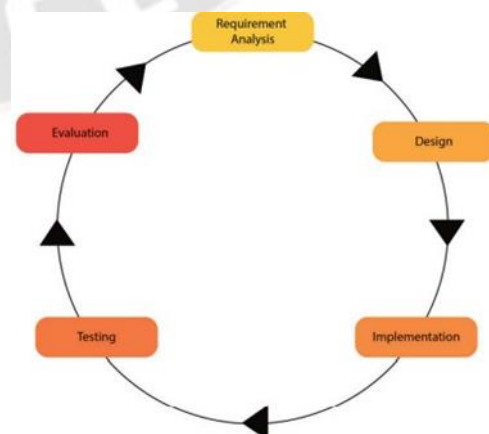


Figure:3 System development cycle

The transport activities are analyzed throughout the explaining queries stage, the first section of the method enhancement period sequence. Stopping details remain marked in transport companies and delineated institutional plans. During this connection, transport administrators' processes are created manually in the transport corporation. We tend to

analyze that vehicle prices are increased because of pendent sustaining and non-performing disciplines. To this purpose, coming up with and completing transport pursuit and administration systems have enhanced a requirement.

Table: 2. Transportation corporation performance criteria.

Criteria	Type (Per Year)
1.Number of full-time employees and driver staff	35000 person
2.Total working hours	8-hour average
3.Total expenditure enterprises (vehicle maintenance and repair)	BDT 2 million
4.Total capital	BDT 1000 cores
5.Total fuel	BDT 4.5 cores (Per day)
6.Total visited road	15000 km (Per day)
7.Number of expired vehicle inspection	95 pcs
8.Number of expired traffic insurance vehicle (total number)	116 pcs
9.Number of expired periodic maintenance of vehicle	50 pcs
10.Number of "out of route" alert	Service
11.Number of complaints about inability of vehicle	Service

'Vehicle tracking and administration IT operation structure is described in arrangement device (figure.4). Transport locating, speed, and gap statistics from hooked-up GPS gadgets on the automobiles are treated in the gadget. After numerous inquiries are crafted of the database, the use of

describing tools, energetic automobile monitoring and coverage monitoring operations maintenance and restore reviews are done for automobile monitoring and control from the software operating system.



FIGURE:4 VICHLES TRACKING AND MANAGEMENT METHOD

### 3.2 Data collection methodology

Regarding the framework, the primary portion is receiving region information from vehicles. Vehicle monitoring methods are established on all vehicles in

public transport corporations. Global Positioning Method and approved Radio Packet modules endure into every bus monitoring device. The GPS module interacts with the protectorate tv for pc to make the



region information, after which this information is dispatched over that server for the usage of GPRS modules. Support programming protocols are used to supplying conversation among car monitoring gadgets and servers. Socket programming and Port communication.

Support programming protocol recognizes the combination technique among tools in unique ways. For case, connection protocols are applied as Transmission Control Protocol Person Datagram Protocol for statistics switches among patron and server in literature. The maximum vital perfection among those etiquettes is TCP ensures statistics frequency except UDP etiquette. TCP is used as a statistics transmission order within side the WWW wherein massive statistics packages are transferred precisely and predicted to expose predominant troubles concerning statistics loss all through transmission.

The UDP order creates a shorter quantity of site visitors at an equal time than the TCP rules. In the mild of the preceding data, UDP order is used for a necessary little quantity information packet and lowering fee toward the equal time undergoing data loss (fig-5)



Figure: 5 Data transmission (Vehicles and UDP server).

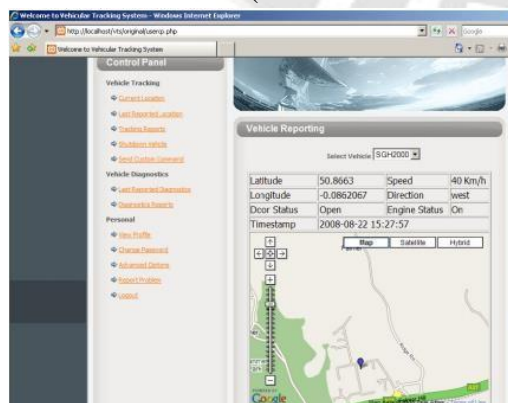


Figure:6 Structure of data packet

Fig: 5 explains that the online interface originated as a region of method implementation. It explains the message once an eminent log-in performance by a legitimate user. The diagram indicates Bangladesh's capital in Dhaka to Bogra Road of Bangladesh Route, wherever this complete method has experimented. The data presented are time data, speed, regulation, door, and distributor standing data as results of these tests aren't performed by golf stroke the IVU into a vehicle.

### 3.2 VEHICLES TRACKING SYSTEM AND MANAGEMENT

The sensible bus and truck are visible evidence of an ingenious installation mistreatment IoT; it's essential to watch the transportation system and style solutions to boost the system's standard among potency in residential versatility. This segment tends to form parts like vehicle choice, new vehicle and task written record, and vehicle selection supported time and department.

Vehicle selection is completed in keeping with the license tag, date, and departments. Fresh transportation and assignment registry modules are designed for mistreatment renewed knowledge within the operation.

In the meantime, the system shows and calculates gasoline consumption, insurances, inspection-inspired expired vehicles, maintenance expired vehicles, etc. Prepare weekly, monthly reports and submit them to the management system. The invention of statistics records result from the arrangement construction method is performed separately with consultants (Figure: 7)



Figure:7 Bangladesh Road Route

The beginning step of the mover pursuit and management system is to process information from transports into the policy. Locating data is entered into the lead after the process of fresh incoming information. "Users" 'table for regularity users,' "institution" table for activities, "job" table for tasks of drivers, "vehicle" table for info regarding materials, "vehicle\_location\_log" table for having the 'immediate location; of the bus is made with taking into thought the arrangement specifications through information style (Figure 8). MySQL systems are circumscribed due to their open supply and suitability with the opposite programming languages employed in this design employed in this design.

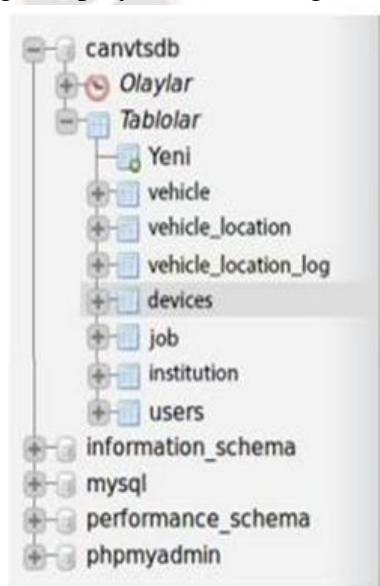


FIGURE : 8 DATABASE STRUCTURE

## 4 Application

The transportation tracking and management method' comprises several elements: active vehicle tracking, insurance review-monitoring systems, and resources-replacement parts. All of those coverage procedures are designed following the required company performance measures. The purpose of a motorized application method is to seem out the particular position or place of this bus can show right results, wherever the technique used is that the advantage from sensors places in on every bus, and in addition, the efficiency of GPS as browser information or data bucket provide the in-depth pursuit of bus location and position with the employment of the transferrable application, can with success entrance the bus's whereabouts, departure position, and once the bus arrives at the meant location. A review of the projected administration vogue is usually observed in Figure 9.



Figure: 9 Application of Software

The primary show program is ready when the design is ready is the begin menu, as explained in Figure 9. Before the user might access the trip' destination, the GPS that has been put in on the bus will send a symbol to the server from where the bus is, which is then gathered and bestowed on the mobile user within the type of map showing locations wherever the bus is located when a showing is also a projected application that wants every user to fill among the user' destination location and current location.



## 5 DISCUSSION AND CONCLUSION

The field of research confirms whether or not using IT will increase the appearance of public transportation corporations. Firstly, the motives of the corporation are decided after which measured its overall performance indicators. Information technology-primarily based vehicle tracking totally and control gadget are installed in phrases of the needs. Among the initial of this gadget, the organization's overall activities command, working costs, and maintenance costs were reassessed via way of means of decrease.

According to the 'National Judiciary Informatics System project, the ministry has rescued 469million euros in 10 years. This organization's calculated performance indicators, car costs, and corporate expenses are reassessed by a reduction of 24% (see in Table 3).

In our research, also we used similar performance criteria. That's why according to the 'National Judiciary Informatics System project', we compared our hypothesis. After applying the Trackingsystem and management, we can get an exact number of decreases in Bangladesh public transportation.

Table 3. Institutional performance criteria comparison between 2014 and 2015.

Criteria	2014 values	2015 values
	Number (per year)	Number (per year)
1.Number of full-time employees staff	5 person	5 person
2.Total working hours of employees	8 hour (day)	8 hour (day)
3.Total expenditure enterprises (vehicle maintenance and repair)	45.000 TL	33.000 TL
4.Total capital	90.000 TL	65.000 TL
5.Total fuel costs	250.000 TL	200.000 TL
6.Total visited road	45.000 km	35.000 km
7.Number of expired vehicle inspection	5 pcs	-
8.Number of expired traffic insurance vehicle	15 pcs	-
9.Number of expired periodic maintenance of vehicle	8 pcs	-
10.Number of "out of route" alert	9 pcs	2 pcs
11.Number of complaints about inability of vehicle	12 pcs	2 pcs

The research outcomes showed the study's hypothesis, "Information technology support has a definite contribution over this overall performance boom in public organizations." Additionally, the machine permits the customers to achieve "automate" and "informative. The "automate" approach saves the coordinated reports robotically into the machine, after which presenting documents approximately the up-to-date fame of the vehicles.

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