

## CHAPTER III

### PERFORMANCE REVIEW RELATING TO STATUTORY CORPORATIONS

#### 3.1 BANGALORE METROPOLITAN TRANSPORT CORPORATION

#### INFORMATION TECHNOLOGY SYSTEMS APPLICATION AND GENERAL CONTROLS OF THE BANGALORE METROPOLITAN TRANSPORT CORPORATION

##### Highlights

The limitations in Global Positioning System (GPS) in tracking data had resulted in gaps in trip data and thus the facility could not support calculation of hire charges on actual kilometres performed by private owners.

*(Paragraph 3.1.3)*

Irregular intimation of schedules and trips to the service provider, the system could not link the tracked data to schedules on-line and help in monitoring deviations in operations on real-time basis.

*(Paragraph 3.1.4)*

Non-integration of the vehicle tracking facility with other application packages, calculations with regard to earnings per kilometre (EPKM), effective kilometres, cancelled kilometres, etc., had to be carried out manually.

*(Paragraph 3.1.5)*

Free access of the firm's representatives to the Server of the depot exposed to the risk of loss of revenue. Moreover, risk of leakage of vital information and manipulation of the reports during downloading of tracking reports from on-line vehicle tracking system in editable worksheets by firm's representatives could not be ruled out.

*(Paragraph 3.1.8)*

Failure to update the information and correct errors in the Website limited its utility.

*(Paragraph 3.1.9)*

The entire investment of Rs.79.50 lakh, made by the Corporation on the Off-line Vehicle Tracking System was unfruitful due to lack of feasibility study of the system.

*(Paragraph 3.1.10)*

**Incorrect application of rates for On-line GPS vehicle tracking facility had resulted in excess payment of Rs.14.50 lakh over a period of 13 months.**

*(Paragraph 3.1.11)*

**A deposit of Rs.1.40 crore was made in excess of the minimum required in Escrow Account created for releasing payments to GPS service provider, resulting in blocking up of funds.**

*(Paragraph 3.1.12)*

**Premium against advertising rights in buses to the tune of Rs.12.25 lakh, was yet to be recovered.**

*(Paragraph 3.1.14)*

### **Introduction**

**3.1.1** The Bangalore Metropolitan Transport Corporation was formed in August 1997, after bifurcation of the Karnataka State Road Transport Corporation (KSRTC), to exclusively cater to the local transportation needs of the City of Bangalore. The Corporation had a two-tier system of administration with Central Office and Depots, under the management of one non-official Chairman and nine official Directors. There were 28 Depots and one Central Workshop under its jurisdiction as on 31 March 2007.

The Corporation had undertaken a project for On-line tracking of buses over Global Positioning System (GPS) and also computerisation of all operations of its depots.

The On-line Vehicle Tracking System over GPS was introduced with the objective of achieving improvement in trip operations, which in turn could help in enhancing citizen services like electronic display of arrival/departure timings, etc. The other benefits intended were the automatic calculation of hire charges for private hired buses based on actual distances covered and facilitating passenger information system. Two firms were entrusted with the project under separate agreements on Build-Own-Operate-Transfer (BOOT) basis.

The Corporation had so far invested around Rs.8.14 crore on Information Technology (IT) assets including expenditure on various computerised activities.

### **Scope and methodology of audit**

**3.1.2** The IT Audit was taken up to assess the achievement of objectives, as also to check effectiveness and adequacy of IT controls in operation of the On-line vehicle tracking system through GPS in particular and of other application packages/IT assets in general.

A test-check of records was carried out in the Central Office and the operation of application packages were checked in four<sup>89</sup> Depots of the Corporation.

### **Audit findings**

#### **Deficiencies in IT systems**

##### **Limitations of technology**

**3.1.3** The On-line vehicle tracking system was designed to track the movement of each bus by satellite, via radio frequency signals from the 'On-bus transmitter unit' (OBU) and transmit the captured data to 'communication bankers' through Global Services for Mobile communication (GSM) technology, at intervals of every 10 seconds. The tracking data would then be processed at the control centre, using the inputs relating to trip schedules of each bus (Form IV), for generating reports through customised software.

The GPS tracking facility was reported to have inherent limitations like loss of connectivity due to selective availability of satellite constellation, buses not being in the direct and unobstructed 'line of sight' with the satellite, as large parts of the travel paths came under dense tree covers, flyovers and bridges; between a cluster of high-rise buildings, or while the bus was parked under a shelter. Further, technical problems like jamming of communication lines due to overload; cellular service not being available at remote areas; *etc.*, led to disruption in service. Due to such limitations the tracking data had not been continuous on many occasions, resulting in many gaps in trip data.

Thus, the purpose of utilising an advanced technology had not been served as achieving improvement in operations in terms of schedule adherence; control over deviations in routes, traffic load analysis; driving pattern analysis had not been fully possible. The facility also could not support calculation of hire charges and effective/cancelled kilometres performed by private operators.

The efforts in finding a solution with appropriate reflecting/boosting of signals to avoid loss of trip data were yet to bear fruits.

The Corporation had thus failed in making a thorough analysis of limitations of the system before implementation of a technology, on account of which, expenditure amounting to Rs.62.78 lakh (Rs.58.87 lakh towards charges for service and investments of Rs.3.91 lakh on hardware), remained unfruitful.

#### **Inadequate inputs**

**3.1.4** The Corporation had not fixed a specific time frame for ensuring timely intimation of schedules and trips to the service provider of On-line vehicle tracking system, on account of which, the system could not link the tracked data to schedules On-line and help in monitoring deviations in operations on

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<sup>89</sup> Depot 7- Subhashnagar, Depot 3 – Shanthinagar, Depot 27- Jigani and Depot 28- Hebbal.

real-time basis. Consequently, unreliable outputs could not help in improving efficiency of service, planning schedules for repairs and maintenance of buses.

### **Non-integration of packages and depots**

#### ***Vehicle tracking facility***

**3.1.5** The Corporation had not made any provision to integrate the data derived from the vehicle tracking facility with other application packages in order to automatically correlate data and cross-verify common information, for effective monitoring. In the absence of such integration, the calculations with regard to earnings per kilometre (EPKM), effective kilometres, cancelled kilometres, *etc.*, had to be carried out manually, on the basis of the Trip Sheet submitted by each conductor at day end. This manual intervention could have been avoided, had the module been integrated with the ERP package as well as the Ticket Revenue Accounting (TRA) module, in which, the GPS data would have served as inputs for such calculations automatically and also avoided duplication of data entry in the respective packages.

#### ***Enterprise Resource Planning (ERP) solution***

**3.1.6** Though the ERP solution was envisaged for automating and integrating the complete business functions of the Corporation, with the control at the Central Office, the same had been installed and operated on a stand-alone basis even in three depots for over two years despite the agency having been provided with additional resources.

The objective of integrating the data for effective monitoring was thus not achieved in spite of investments on the infrastructure.

#### ***Ticket Revenue Accounting (TRA) module***

**3.1.7** Since the TRA module database was not centrally managed, a consolidated picture of the revenue collections was not available at the Central Office at a given point of time. The manual task of collection of details from each depot and consolidation, as well as duplication of data entry for financial accounting could not be avoided. Lack of centralised management of the package also caused unintended delays in carrying out any modifications to the source code.

#### ***Inadequate access controls***

**3.1.8** The Servers at depots were at risk of physical damage/tampering as they had not been maintained in a protected environment and had easy accessibility. The Servers were also not maintained in dust-free surroundings, thereby exposing it to the risk of breakdown.

The firm which was entrusted with the implementation of the ERP solution hired people for data entry work in the three depots. These operators were not under constant supervision of the firm's staff nor were scrutinised by the Corporation prior to their deployment and had free access to the Server of the

depot, which contained the important data of the TRA module of the Depot Computerisation package, as well as various other administrative documents. By allowing such unrestricted access to third parties without proper measures for security, the depots were exposed to the risk of loss of revenue.

Further, the tracking reports from On-line vehicle tracking system, received via electronic media by all depots were in editable worksheets and were thus open to the risk of tampering and manipulation, either in transit or at the destination. The risk of leakage of vital information and manipulation of the reports therefore could not be ruled out.

### **Deficiencies in Website**

**3.1.9** A website was hosted in January 2001 for providing information On-line to the general public on the operations of the Corporation, its financial status, types and timings of bus routes, various services offered, complaints registering, etc. The hosting and maintenance of the official website of the Corporation had been outsourced to Bhasinsoft India Ltd., involving an expenditure of Rs.6.94 lakh, apart from recurring expenditure towards updating specific information periodically, on an average of Rs. 0.10 lakh per update.

On a review of the official website of the Corporation during May 2007, it was noticed that the website had not been maintained up to date. There were variations between the English and Kannada versions, design errors and incomplete information, as illustrated below:

- \* The information and number of hyperlinks differed between the English and Kannada versions.
- \* Many of the pages did not have a hyperlink to navigate back to the 'Home' page.
- \* The fare table for 8 Volvo services out of 11 did not display the applicable stage-wise fares. The results page of the lottery scheme did not display necessary information.

The Corporation stated that action had been initiated to rectify the errors on the Website.

### **Off-line Vehicle Tracking System**

**3.1.10** The Corporation implemented an Off-line vehicle tracking system using GPS technology during March 1999. This system was implemented in technical collaboration with Bharat Electronics Limited (BEL) with an objective to monitor trip operations of hired vehicles from private operators and to automatically calculate hire charges according to the kilometres covered on a daily basis, in place of the unreliable manual accounting system. The GPS units were first installed and operated in 200 buses. However, the units supplied by BEL, failed and had to be replaced by another model. The

data from each bus had to be downloaded, which required personnel to physically go to each bus unit to download the data every day. This was found impractical since one person could attend to only about 30 buses in a day. The feasibility of attending to 200 buses a day as also testing of working of the units, could have obviated the problem. In the absence of provision for automatic generation of reports, a large number of staff was required to analyse the data and prepare requisite reports, which involved around two to three days' time. Such delayed information was far from useful as it was not available on real time basis for initiating corrective action. The Off-line facility had therefore, completely failed in providing any tangible advantage to the Corporation in improving or in monitoring of the operations of private hired buses, though the system was in operation for four years. Consequently, the system was discontinued in March 2003 and the new on-line vehicle tracking system was taken up in its place, resulting in the entire investment of Rs.79.50 lakh, on the off-line system unfruitful.

### **Incorrect application of contractual provisions**

#### ***Incorrect application of rate for on-line GPS facility***

**3.1.11** The Corporation issued a Letter of Intent in February 2004 in favour of Arya Omnitalk Wireless Solutions Limited, Bangalore (AOTWSL) for On-line GPS services for 2,000 buses at the rate of Rs.879 per bus per month for five years, being the lowest amount quoted and entered into a BOOT Agreement in December 2004. However, the Corporation had allowed the higher rate of Rs.1,102 per bus per month, which was applicable for 500 buses against the applicable rate Rs.879 per bus per month only, though the implementation was being done in stages. This had resulted in an excess payment at Rs.223 per bus per month, over a period of 13 months (October 2005 to November 2006), amounting to Rs.14.50 lakh. The reasons for allowing the higher rate of Rs.1,102 per bus per month to the firm were yet to be provided.

#### ***Deposit in excess of minimum required in Escrow Account***

**3.1.12** In terms of Para 7.2 of the BOOT Agreement with AOTWSL, an Escrow Account would be maintained and operated by the Corporation through a Bank for charging off the Fixed Charge payments due to the GPS service provider on a monthly basis. The Escrow Account would have a minimum balance equal to three monthly fixed charge payments, assuming 100 *per cent* operation of all the GPS units, without allowances for outages of any kind. However, while executing the Escrow Agreement on 27 April 2005, the Corporation deposited a sum of Rs.1.53 crore in the form of a Fixed Deposit, for meeting the payments due to the service provider. Taking into account, the applicable rate of Rs.879 per bus per month, the minimum balance required to be maintained for 500 buses in the Escrow Account would have been Rs.13.19 lakh only. The deposit made in excess in the Escrow Account, had resulted in blocking up of funds to the tune of Rs.1.40 crore.

### ***Loss of advantage of repetitive bids***

**3.1.13** On the basis of the Expression of Interest (April 2005), Abacus Computer Centre (Pvt) Limited was entrusted with the pilot project of developing the ERP solution - 'TTtrack' for customised automation of depot activities.

The firm took up the development and customisation in one depot in October 2005. Though the functioning of the ERP solution was not complete in all respects even after being in operation for over two years in the depot, the firm was entrusted with the work of two more depots (July-August 2006) on the same lines.

The Corporation again called for fresh tenders for computerisation in five more depots (April 2007). The Corporation also proposed to float yet another tender for the computerisation of remaining 23 depots after finalising and identification of the solution for the five depots.

This indicated that the Corporation had no confidence in extending the ERP solution of Abacus to the remaining depots and was exploring other alternatives by calling for fresh tenders. Due to such *ad hoc* measures taken for implementation of computerised projects, the Corporation had failed to achieve any benefits so far and had also lost the advantage of obtaining competitive rates and services through a single tender.

### ***Non-receipt of premium amounts***

**3.1.14** Under the BOOT agreement with MobiApps (India) Limited, the agency would provide GPS tracking services and also pay a monthly premium to the Corporation for each of the 700 buses allocated, at the slab rates of Rs.50 in the first year, Rs.100 in the second year, Rs.250 in the third year, Rs.750 in the fourth year and Rs.1,000 in the fifth and sixth years, *in lieu* of panel advertising space inside the buses. Thus, apart from obtaining the GPS tracking service, the Corporation would earn an income of Rs.2.65 crore over a period of six years. A monthly premium, totalling to Rs.16.10 lakh, calculated for the period from April 2005 to May 2007 as per the agreed slab rates was however, not remitted by the firm to the Corporation regularly. It was replied to an audit query that the firm had remitted premium for only 11 months from May 2005 to March 2006 at the rate of Rs.50 per bus and had not paid any amounts thereafter. On the basis of data available, the arrears from the firm worked out to Rs.12.25 lakh<sup>90</sup> (May 2007). Early action was needed to recover the arrears from the firm.

### **Conclusion**

**Though the aim of the Corporation was to improve overall quality of operations through advanced facilities such as GPS and ERP solution, it had not been able to obtain the resultant benefits for improved services to citizens. This was attributable to lack of analysis of the limitations of GPS**

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<sup>90</sup> Rs.16.10 lakh – Rs.3.85 lakh (Rs.50\*700 buses\*11months)

technology, poor logistics in implementing an ERP solution and not building up proper validation and security controls in use of other IT assets. The department could also not able to integrate the vehicle tracking facility with other application packages, calculations with regard to earnings per kilometre (EPKM), effective kilometres, cancelled kilometres, *etc.*, had to be carried out manually. The data either at the depot server level or during downloading from on-line system in editable worksheet was not secured.

### **Recommendations**

The Corporation needs to

- \* resolve limitations in GPS tracking system considering introduction of appropriate enhancements to derive complete benefit of tracking buses
- \* establish seamless interface between the vehicle tracking system and other packages
- \* consider phasing out duplicate computerised activities and maintain uniformity in operations
- \* fine tune the official website to make it error free and to properly project the profile of the organisation, in addition to providing value-added information to the general public.