

Chapter 1 Introduction

Indian Railways run more than 12000 passenger carrying trains on average (like Duronto, Rajdhani, Shatabdi, Mail Express, Passenger, Suburban etc.) and carry about 23 million¹ passengers on originating basis every day over its vast network. Integrated Coaching Management System (ICMS) is a critical IT application which computerises

- the whole coaching operations of Indian Railways and has different modules to cater to railway requirements for day to day operational activities, maintaining computerised records of various events & functionalities,
- monitoring & management of passenger carrying vehicles, other coaching vehicles and passenger locomotives; and
- generation of MIS reports for decision making and to ensure optimum utilisation of resources.

ICMS was sanctioned in 2003. The project cost of ₹ 18.76 crore was approved in 2006. As on 31 March 2016, an amount of ₹ 16.28 crore has been incurred on project implementation and ₹ 34.6 crore on maintenance of the project.

1.1 Modules of ICMS

ICMS comprises of the following modules:

- a) Punctuality Analysis and Monitoring (PAM):** This module provides various functionalities for monitoring the running and punctuality of passenger carrying trains. PAM automatically picks up the train running timings from the Control Office Application² (COA) & Train Management System³ (TMS). Train timings for non-COA sections are directly fed by users into PAM through utility provided for the purpose.
- b) Coaching Operation Information System (COIS):** This module captures all operational activities of coaches, rakes and passenger locos. Data on rakes and coaches related operations is entered into the system at station level and for locos at divisional level. Zonal and divisional users of COIS can also proxy to station level, if required to do reporting for the station. COIS is integrated with PAM/COA, Freight Operations Information System (FOIS) and other applications.
- c) Data Module:** This module facilitates feeding of all master data used in ICMS pertaining to trains, coaches, infrastructure etc. including information such as train definition, train schedule, master/standard consist⁴, train links,

¹ Source: Indian Railways White Paper of February 2015 (indianrailways.gov.in)

² Control Office Application (COA) - Train operations on the Indian Railways are controlled and monitored by the Control Rooms in all the divisional/ area control offices. The Control office, by its very nature never shuts down and works all hours of the day and every day of the week. The Control Office Application facilitates monitoring of train movements in real time and provides movement of scheduled and unscheduled trains planned and controlled through the computer aided interface. It is this application that feeds the National Train Enquiry System (NTES) that provides passengers up to date information on train running.

³ Train Management System (TMS) - This is an application implemented in WR and CR for integrated management and monitoring of suburban train movements and signalling, as well as planning train routes, diversions and introduction or withdrawal of rakes in service.

⁴ Consist of train contains details like coach type, coach number, coach count etc. which are part of the train/rake

station/yard lines, capacity etc.

- d) **Report Module:** This module provides various reports related to all other modules including reports on master data, monitoring, user performance, historical reports, analytical reports, utility reports, etc. for different levels of ICMS users. These reports can be used as tools for monitoring, analysis and decision making.
- e) **Utility Module:** This module provides facility for user management and user feedback.

1.2 Objectives of the ICMS

The Integrated Coaching Management System application was developed with the following objectives:

- a) Monitor punctuality of Mail Express/Passenger trains
- b) Monitor status of coaching stock in real time and online
- c) Facilitate augmentation of train composition on the basis of traffic demand to maximise revenue
- d) Facilitate planning and running of special trains
- e) Set Bench mark for Asset Maintenance
- f) Plan timely maintenance schedule including IOH/POH to minimize idling of coaches outside shop
- g) Prompt planning for idle coaches and their timely booking and usage to generate more revenue to the Railways
- h) To avoid manual manipulation and to provide fool proof service to enhance the image of Railways
- i) To provide MIS for coaching operations

1.3 System Architecture

The design is modelled on three tier client server technology using middle ware and Relational Database Management System (RDBMS). Data from ICMS locations (stations) and Control Offices is captured through thin clients/PCs and sent to servers installed at Computer Data Centre at the Centre for Railway Information System (CRIS) through communication links for transactions processing. Application servers at the CRIS are networked and linked to a central database for transactions processing. The central database provides management reports to the users at Railway Board, Zonal, Divisional and Station level.

1.4 Organization

The organization of Chief Administrative Officer (CAO), FOIS which was created in 1994 for implementation of FOIS project over Indian Railways, functions as a coordinating office between Railway Board, Zonal Railways and CRIS for implementation of ICMS. The officials responsible for implementation of ICMS at Zonal, Divisional and Station levels of the Operating, Mechanical and

Electrical departments are as follows:

Level	Operating	Mechanical	Electrical
Zonal	<ul style="list-style-type: none"> • Chief Operations Manager 	<ul style="list-style-type: none"> • Chief Mechanical Engineer 	<ul style="list-style-type: none"> • Chief Electrical Engineer
	<ul style="list-style-type: none"> • Chief Passenger Transportation Manager 	<ul style="list-style-type: none"> • Chief Rolling Stock/Workshop Engineer 	<ul style="list-style-type: none"> • Chief Electrical Loco Engineer
	<ul style="list-style-type: none"> • Dy. Chief Operating Managers 	<ul style="list-style-type: none"> • Dy. Chief Mechanical Engineer/Coaching 	<ul style="list-style-type: none"> • Dy. Chief Electrical Engineer/Operations
	<ul style="list-style-type: none"> • Senior/Assistant Traffic Manager, Chief Controller and other supporting staff 	<ul style="list-style-type: none"> • Chief Office Superintendent and other supporting staff 	<ul style="list-style-type: none"> • Chief Traction Loco Engineer and other supporting staff
Divisional	<ul style="list-style-type: none"> • Sr. Divisional Operations Manager 	<ul style="list-style-type: none"> • Sr. Divisional Mechanical Engineer 	<ul style="list-style-type: none"> • Sr. Divisional Electrical Engineer
Station	<ul style="list-style-type: none"> • Chief Station Manager/Station Manager/Station Superintendent 	<ul style="list-style-type: none"> • Chief Power Controller 	<ul style="list-style-type: none"> • Chief Power Controller
	<ul style="list-style-type: none"> • Chief Yard Master/Chief Train Clerk/Head Train Clerk/Train Clerk 		

At CRIS, activities relating to development, maintenance and implementation of ICMS are looked after by an ICMS group headed by a General Manager who works under the overall control of Managing Director and is supported by a technical team comprising Principal/ Senior Project Engineer, Project Engineer, Sr. Software/Network Engineer, Consultants etc.

1.5 Audit Objectives

The audit of ICMS was conducted with a view to:

- I. Evaluate the extent to which the objectives of implementing ICMS were being met,
- II. Review the Application Controls to assess the extent to which they ensure proper authorisation, completeness, accuracy and validity of input data and transactions, and
- III. Review the IT Security to check the extent to which it is capable of reasonably protecting business critical information and assets from loss, damage or abuse.

1.6 Audit Criteria

IT Audit of ICMS was conducted keeping in view of the rules and regulations contained in Railway Codes/Manuals, instructions/guidelines/procedures issued by the Railway Administration from time to time and best practices prevalent in IT environment.

1.7 Audit Methodology and Scope

Audit methodology included scrutiny of records related to development, implementation and maintenance of ICMS project at CAO (FOIS) office, CRIS office, Zonal/Divisional Headquarters and selected ICMS locations. Online ICMS reports were reviewed, information pertaining to different aspects of ICMS was gathered from Zonal/Divisional Headquarters and from various ICMS locations using questionnaires. Discussions were held with officials at

zonal/divisional/station levels. ICMS data was analysed using computer assisted audit techniques. Entry and Exit Conferences were held at Zonal level. Exit conference was also held at Railway Board with Additional Member (Budget), Additional Member (Computerization & Information System), Director (Coaching) and other officials from CRIS.

1.8 Sample size

As of 31 March 2008, ICMS was implemented over 257 locations (445 terminals) over various Zonal Railways. This included Zonal headquarters, Divisional headquarters, stations, etc. During 2015-16, due to increase in volume of passenger traffic and coaching trains, a new work 'Expansion of ICMS System' for provision of ICMS terminals at Proxy locations (i.e. at locations where ICMS was not installed and their activities were captured through Divisional/Headquarters control offices) was sanctioned by Railway Board at a cost of ₹ 21.34 crore for 249 locations (510 terminals) over various Zonal Railways. It was observed that as on 30 April 2016, ICMS was not installed/not made operational on 11⁵ locations out of 257 locations planned earlier over five Zonal Railways (ER, CR, SECR, SCR and NR).

The sample selected for the review was as follows:

- a. For Audit review, Zonal headquarters offices, one divisional control office (minimum) and four locations up to ten locations with addition of one location for every five locations (beyond ten locations) or part thereof were selected over each Zonal Railway. Overall, 128 locations of all Zonal Railways were selected for review. Details of these locations are given in **Annexure 1**.
- b. The transaction data of ICMS for three months' period pertaining to July to October 2015, collected from CRIS, was analysed.
- c. Online ICMS reports during October 2015 to July 2016 were reviewed. Contents of ICMS data/reports were compared with manual/physical records on test check basis to verify their completeness and accuracy.
- d. IT Security evaluation was primarily focussed on application level security.
- e. The field audit work was conducted during October 2015 to April 2016.

1.9 Acknowledgement

The report includes the responses of Zonal Railways and Railway Board gathered during various discussions/Exit Conferences held at Zonal/Railway Board level. The Audit team wishes to acknowledge the cooperation extended during this audit by the management and staff of the Railway Administration at Zonal/Divisional Headquarters and station level as well as CAO (FOIS) office and by the CRIS ICMS team.

⁵ Chief Yard Master, Howrah, Azimganj, Katwa stations in ER; Dadar yard in CR; RRI Bilaspur in SECR.; C&W depot Secunderabad, Lallaguda workshop in SCR; New Delhi yard, Delhi yard, Sr. Station Manager, New Delhi, Amritsar station in NR