www.ijecs.in
International Journal Of Engineering And Computer Science ISSN:2319-7242
Volume 2 Issue 5 May, 2013 Page No. 1685-1687

RAKE MANAGEMENT SYSTEM (RMS): OPERATIONAL ASPECT OF FREIGHT OPERATIONS INFORMATION SYSTEM (FOIS) FOR INDIAN RAILWAYS (IR)

Agarwal, Seema*[1]

1. Jagannath International Management School, New Delhi. GGSIPU, New Delhi

*corresponding author

Email of corresponding author: agarwalseema10@gmail.com

Abstract: This paper explores need, development and main features operational subsystem of FOIS for IR which is called Rake Management system. It is a system for management and control of freight movement that also assists managers to optimize asset utilization. It has main advantage of providing real time data for wagons/ rake for proper decision making. The paper also explores advantages and certain shortcomings in the interface mechanisms and future integration with latest technologies.

Keywords: FOIS, freight, Indian railways, RMS, rake management, information systems

Introduction: Railways are lifelines of India. It is one of the world's largest rail networks under a single management. The route length is around 63,332 km with more than 8000 stations. As it is the backbone of nation's transport system, IR owns more than 25,000 wagons, 45,000 different types of coaches and 8000 locomotives [1, 2]. It carries nearly 980 million tonnes of freight in a year. Infact freight trains generate two-thirds of the IR revenues. Major commodities include coal, iron ore, agricultural products, petroleum products etc [1].

Unlike passenger trains, freight trains do not run to a fixed schedule. So one of the biggest problems is to track and manage rakes. Rakes often run dead miles after unloading, while at some locations there is a shortage of rakes [2]. Many a times, the data was not available at the right time. And sheer massive scale of operations makes it an information activity, which lead to difficulty in management and optimum utilization of resources [2, 3]. Thus, real time information allows proper allocation decision making thus ensuring high levels of mobility within the system. It led to development of FOIS.

Information Systems: Information systems can be divided into three broad but overlapping levels(Figure 1) viz., 1. Transaction processing Systems (TPS) which involves registering demand, issuing tickets etc; 2. Management Information System (MIS) which is based on the information generated normally; and 3. Strategic Information Systems (SIS) based on which investment and asset renewal decisions are taken.

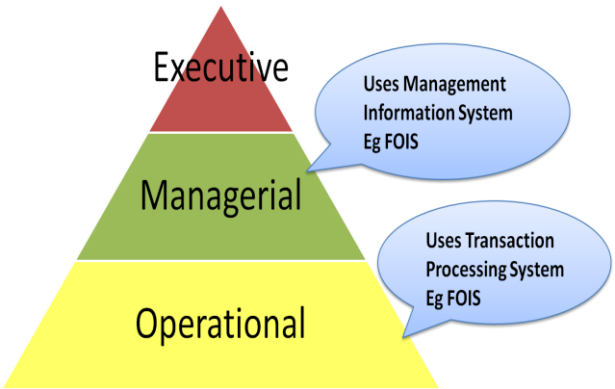

Figure 1 Levels of Information system

FOIS falls in both TPS and MIS categories

[3].Rake Management System: FOIS comprises of two major subsystems (Figure 2): RMS for handling the operational aspect of IR and Terminal Management System (TMS) for handling the commercial aspects of IR. The other important subsystems for better decision making: MIS reporting, Rake Allotment/Allocation System (RAS), Terminal Pipeline Management System (TPMS) [2, 3].

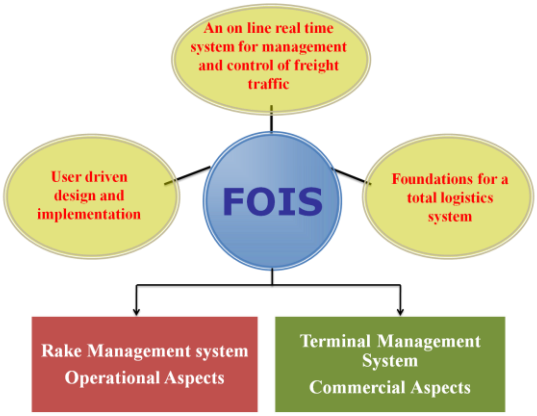

Figure 2 FOIS and its subsystems

RMS is basically a set of utilities and tools designed for analysis and decision making to do with overall use of physical train units or rakes, their deployment and cycles [4]. It mainly provides information about rakes cycles, platform and track occupancy and maintenance activities. These all information is maintained in form of databases which can be easily accessed and modified. . It is responsible for tracking and managing freight wagons, freight-class locomotives and other operations of the freight system [4, 5].

Its main aim is to optimize the use of each and every rake and also to increase the life span of the rakes.

Development and Implementation: In FOIS development, RMS implementation took place in two phases: the first phase was analysis in bulk. It mainly focused on asset utilization and optimizing terminal handling performance. This included train and wagon interchange, Rake based consignment tracking and wagon holding. The second Phase was capturing wagon wise data [5, 6]. Phase 3 was implementation of TMS.

Structuring of RMS: It has state of the art 3-tier client server architecture (Figure3) [6]. Terminals are present in many field locations such as control offices, lobbies in yards; good sheds etc. to capture data. These terminals are connected to application servers for processing. Servers are networked amongst themselves and to the central server for global level transactions [6, 7]. The 3-tier client server architecture has Oracle as RDBMS with Oracle Tuxedo as middleware and Visual Basic EE at the front end. Operating system is HP Ux 11i on HP Integrity server [6]. The central database server holds the data as a single image. It also provides management reports at board level but at the same time acts as repository of all the global data. Since, it is a sort of centralized application architecture; a star based network topology has been designed. But for efficient management, a mesh has been created within each zone to provide alternate paths [7].

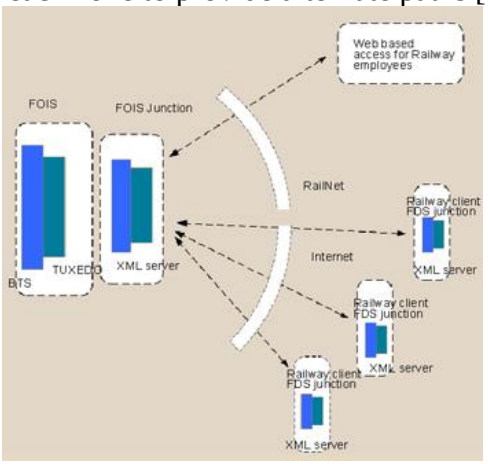

Figure 3 3-tier client server architecture

Advantages and Problems: The main advantage of this system is that it provides with the real time information which is essential for asset tracking and planning. Also there is on-line control over the rolling stock [6]. It helps us in monitoring of all freight trains indicating their position in computerized territory and their expected time of arrival. This enables recipient to have an accurate forecast and be prepared to handle the cargo. Even out-bound rakes are monitored and detachments from block rakes are also recorded. This prevents rakes from running dead miles and also reports

missing wagons. It has also recorded all the details or rakes/ wagons in various yards, their phase-wise detention in different terminals, eliminating manual documentation and tedious retrieval systems and inaccuracies [7,8]

But according to a recent report [8], interface mechanism with weighbridges and other applications like crew management system, integrated coach management system, control charting operations etc. still need a lot of development thus limiting the utility of the system. Some processes were performed manually exposing the system to the risk of input and processing errors. Thus master databases contained some errors and validations were either absent or deficient [8]. Thus, in some areas, even the decision on rake allotment were being taken manually, which defeats the entire purpose.

Future Integration: since, this system offers an on-line real time data, there can be much more done for better decision making and proper utilization of rolling stock. Some features that can be incorporated include registration of details or wagons and the requirement of empties (empty wagons distribution system) to ensure minimum empty haulage and optimum utilization of wagons; crew booking and management system which means global tracking of all the crew and web enabled reports and SMS module for crew booking, calling etc. for improved asset utilization [6, 7].

And it also has a plethora of opportunities to be integrated with various applications like electronic payment of freight for any commodity, RFID (system of small electronic tag) based wagon tracking system, revenue accountable and data warehousing system, train charting and control systems at divisions, national train enquiry system to name a few [6].

Conclusions: FOIS enables instant access to information regarding the current status of the consignments in transit, for just in time inventory. It is a system for management and control of freight movement that also assists in optimization of asset utilisation. FOIS comprises the Rake Management System (RMS) for handling the operating portion. In this paper, structure and function of RMS has been explained. It gives strategic advantage to IR for proper monitoring and better decision making for rolling stock. If it can be integrated with other systems, it will prove to be a boon for Indian railways and also its customers.

Acknowledgement: No work can be accomplished without taking the guidance of the experts. It is only the critiques from Ingenious and intellectuals that helped in transforming a product into a quality product. I would like to gratefully acknowledge and express my deep gratitude to JIMS, our concerned institute and its management as well as Indian Railways and CRIS who always helped me in completing this paper.

References:

[1] Raghuram G., Gangwar R., Marketing Strategies for Freight Traffic on Indian Railways: A Systems Perspective, IIMA Research and Publications, 2007, W.P. No 2007-07-03.

[2] FOIS for Indian Railways http://www.fois.indianrail.gov.in/FoisWebsite/

[3] Rangaraj, N., Sohoni M., Puniya P., Garg J., Rake Linking for Suburban Train Services. ICORD – 2002, 2002.

[4] CMC Ltd (2013). 'Freight Operation Information System, http://www.cmcltd.com/industry_practices/transportation/railways_freight_ops.htm

[5] CRIS Projects – Freight Operation Information System (2013) http://cris.org.in/CRIS/Projects/FOIS

[6] Agarwal S., Singhal R., Mittal R., Freight Operations Information System (FOIS) – advanced architecture & its Future. IJLRST 2013, Vol 2 Issue 2.

[7] Design Document of FOIS-CMC

[8] Railway Audit Report, Chapter 2 Freight Operations Information Systems in Indian Railways, Report No 8 of 2010-2011.