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Indian Railway: At a Glance

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Abstract: ***Indian railway system is one of the fourth largest network in the world by size comprising 119,630km of total track forty-five percent of its routes are electrified using entirely 25 kV Ac electric traction ,but the glitch of technical interventions leads the whole system affected through the anonymous delays on every route. Every year the Indian Railways incurs heavy losses due to zero-visibility, it accord a very high priority to the punctual running of trains Improving train operations and timing capacity constraint is a continuous Endeavour .The IR has recently come under acute criticism for not being able to efficiently handle the rapidly increasing amounts of traffic, which is manifested in large run-time delays of trains. The aim of this project is to analyze the run-time delays of express trains in Indian railways. We surveyed that trains in some specific geographical regions, such as the Indo -Gangetic plain, continuously experience high delays designating high congestion in these regions. However, rather astoundingly, the amount of traffic lone cannot explain the geographical variation of delays .The IR time-table contains significant slack, whereby trains running on definite segments frequently traverse the segments in lesser time than is scheduled. The survey of capacity enhancement projects, construction of additional loop lines at stations and doubling or trebling of track lines. To eradicate bottlenecks, through automatic signaling, construction of low height subways substituting level crossings, rail under bridges and over bridges. The Integrated coaching management system would help the on line monitoring of trains. This module will continuously monitors the running of trains, enabling zonal railways and their divisional controls to take prompt decisions in according priorities to train movement .Modernize Indian Railways by using best-in-class technology Evaluate root causes for Indian Railways sedate progress in adopting best in class technology and determine 5-6 strategic shifts best in class technological interventions . Some likely factors are varying traffic-handling capacities of the segments difference in signaling systems, the effects of freight traffic and human factors such as poor administration***

Keywords: Indian railways, transportation engineering, railway industry, Indian Railway Catering and Tourism Corporation, Konkan Railway, train delay

I. INTRODUCTION

The increasing demand for transportation and sustainability makes railways attractive. The ongoing deregulation of state-owned railways means that many new organizations are entering the railway sector. Hence, reducing railway delays is increasingly important to many stakeholders, including passengers, freight customers, train operating companies, railway infrastructure managers and society in general. Therefore, the study of punctuality and its improvement is essential. The purpose of the research presented in this thesis is to explore and describe information and requirements related to railway punctuality in order to support systematic improvements. The focus is on delay causes related to infrastructure maintenance. To fulfill the stated purpose, punctuality requirements, availability concepts, failure and delay data, as well as maintenance decisions, have been studied via theoretical and empirical approaches. Data was collected through interviews, document studies, archival analysis, observations and experiments. It is found that punctuality requirements and performance are currently expressed in many, hardly commensurable, ways. Hence, it is difficult to compare punctuality data from different railways. This is further complicated by the fact that delay attribution is inconsistently performed. It is also found that there is a lack of data on train traffic and infrastructure, for example, causes of delays. Although the consistency regarding ranking of decision-making criteria is rather high, the consistency of maintenance decisions is rather low. In addition, there are many interacting causes affecting punctuality, including infrastructure, timetable, rolling stock, weather and personnel. It is also found that even though unpunctuality might be explained by unavailability of some parts of the railway system, the concept of availability is not well-established and agreed upon within the railway sector. Based on the research findings, it is proposed that punctuality should be treated as the extent to which an event takes place when agreed, for example, the agreement between a passenger and a train operating company concerning the arrival of a train at a certain time. A number of availability measures for railway are also proposed, partly based on analogies to the power industry. Furthermore, the developed and applied methodologies. it is possible to improve data collection and recording, select suitable indicators and increase the awareness of the grounds on which decisions are made, all of which contribute to improved punctuality.

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Railways are a prime mode of transport for passengers and goods in many countries. The railway is not only known for being a comfortable means of transport, it also constitutes a safe and sustainable mode of transport of passengers and goods. In India the demand for railway transport, for both passengers and goods, is increasing).The issue of the punctuality of trains, or rather the unpunctuality, becomes a topic of public attention when passengers or cargo suffer many and lengthy delays.

Transport costs constitute 2% of GDP for India as much less comparision to united state of America that contribute 8.9% of their GDP (gross domestic product). Fixed transportation assets reflect the important role of both the public and private sectors in moving freight. With more and more trains running late in the country, a slew of measures is being taken to curb delays. The railways' punctuality rate in the 1-16 April period was 5% lower than that in the corresponding period last year, down from 84% to 79%. "The railways accord a very high priority to the punctual running of trains. Improving train operations is a continuous endeavour and several initiatives are being undertaken to improve timings.

Capacity constraints and adverse weather conditions are some of the reasons for the delays. About 15,000 trains were affected because of fog from November last year to February of this year. "The entire northern belt was under the grip of an intense fog during this period, throwing train operations off gear in 10 zonal railways. Though most trains continued to run despite the fog, about 3,700 trains were cancelled in 2016-17. The new measures include capacity enhancement projects, including construction of additional loop lines at stations (so that more trains have parking space) and doubling or trebling of track lines. Steps are being taken to remove bottlenecks, with the help of automatic signalling, construction of low height subways replacing level crossings, rail under bridges and over bridges.

A performance analysis of zonal railways reveals that punctuality registered a sharp drop in the North Eastern Railways (down by 11%, when compared to the corresponding period last year), South East Central Railway (- 11%), East Central Railway (-10%), Eastern Railway (-8.9%), West Central Railway (-8%) and Konkan Railway (-6.9%).

Another reason for the delays is congestion, for while traffic has increased considerably over the years, track lines haven't. As compared to 1950-51, the running track kilometres had increased only about 1.5 times, whereas the freight and passenger traffic had grown almost 15 times since then. The situation has been exacerbated by an imbalanced distribution of trains over networks and the fact that freight and coaching trains run on the same track. speed restrictions and cautions imposed because of construction activities along the tracks also adversely affected timings. trains traversing through quadrilateral routes such as the Delhi-Howrah, Delhi-Mumbai, Delhi-Chennai and Howrah-Mumbai corridors have been adversely impacted as these sectors face severe capacity constraints because of the lines' inability to handle any more traffic.

II. RAILWAY INDUSTRY ORGANIZATION-

The Ministry of Railways (MOR) oversees the Indian railway sector through the Indian Railway Board, MOR (IRB). The MOR (IRB) exercises all central government policy powers and administers, supervises, and directs the entities that provide most of the rail services in India. The MOR (IRB) also fulfils most industry regulatory roles, except for safety oversight and railway rate appeals Indian Railways (IR) is the generic term used to refer to the network of railway infrastructure and services that are delivered by 16 geographically-based Zonal Railway Authorities (ZRs). Each ZR has separate responsibilities and operates its own livery. However, the MOR (IRB) is fully responsible for establishing, merging, or abolishing these ZRs and for ZR governance.

The MOR (IRB) appoints ZR general managers, oversees their compliance with MOR (IRB) policies, determines staffing and remuneration policies, allocates rolling stock, fixes tariffs, approves ZR operating and capital budgets, approves certain capital expenditures above specified limits, and reallocates cash deficits or surpluses of each ZR to maintain financial balance. Production units directly under the MOR (IRB) manufacture rolling stock.

This is supplied to the ZRs, which are responsible for maintenance. The ZRs operate all trains within their territorial jurisdiction, including inter-Zonal trains under a system for apportioning revenue, usually collected at the originating station. India's railways are now governed by the 1989 Railways Act (as amended), which replaced the old Indian Railways Act of 1890, under which Government was envisaged primarily as coordinator and regulator. The railway was nationalized in 1951, and virtually the entire rail system became part of the Government of India.

The 1989 Railways Act authorized government and non-government railways. Now, a few separate special-purpose railways exist as joint ventures between the MOR and other entities such as the Kutch Railway Company Ltd. and the Konkan Railway Corporation Ltd. However, the ZRs still carry over 99 percent of railway traffic.

The statistics throughout this case study relate to IR's own network and operations. During the 1990s, perceived failures in operational performance and a deteriorating financial situation prompted Government to appoint an independent expert group to examine IR's situation and make recommendations.

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A. Territorial Readjustment of Zones and In-House Reforms

In order to bring about greater efficiency in administration, speedy implementation of on-going projects, better customer care, reduction of workload on General Managers etc., Indian Railways have decided to create seven new zones by territorial re-adjustment of existing zones. The new zones, having limited financial burden on Railways, will have thin and lean, efficient and modern administrative set up. Two of the new zones have already started functioning.

B. New Steps towards Safety and Security

Safety of 13 million passengers that Indian Railways serve every day is of paramount importance to the system. Over the years, apart from the regular safety norms followed, the network has taken a number of steps through innovative use of technology and stepped up training to its manpower to enhance safety standards. Constitution of Rs.17,000 crore non-lapsable Special Railway Safety Fund (SRSF) to replace the arrears of aging assets of Railways over the next six years has been a historical move in this direction. A number of distressed bridges, old tracks, signalling system and other safety enhancement devices will be replaced during this period. As far as budget allocation for safety is concerned, Rs.1,400 crore was allocated in the revised estimate for the year 2001-02 and Rs.2,210 crore for the year 2002-2003. Extensive field trials of the Anti-Collision Device (ACD), indigenously developed by Konkan Railway, is going on and once deployed across the Zonal Railways, this innovative technology will help railways reduce accidents due to collision between trains. Security of railway passengers is at present a shared responsibility of the Railway Protection Force (RPF) and the Government Reserve Police (GRP). Efforts are on to amend the Railway Act to give more powers to the RPF in ensuring security of passengers on trains and within Railway premises. Deployment of women police Force has been made for security and assistance of women passengers

C. New Trends in Passenger Amenities

To take care of the unreserved segment of the passengers, a new pilot project on computer based unreserved ticketing has been launched this year. Of the 13 million passengers served by the network everyday, nearly 12 million are unreserved passengers. To cater to this huge segment, computer based ticketing systems has been launched for all stations in Delhi area and in due course throughout the country. With this, unreserved tickets can be issued even from locations other than the boarding station and will reduce crowds at booking offices and stations.

D. Indian Railway Catering and Tourism Corporation

with the assistance of Centre for Railway Information Systems has launched On-line ticketing facility which can be accessed through website irctc.co.in. Computerized reservation facilities were added at 245 new locations. At present these facilities are available at 758 locations in the country covering about 96 per cent of the total workload of passenger reservation. Computerized Reservation related enquiries about accommodation availability, passenger status, train schedule, train between pair of stations etc. have been made web enabled. A pilot project for issuing monthly and quarterly season tickets through Automated Teller Machines (ATMs) has been launched in Mumbai this year and has been found very successful. Another pilot project for purchasing tickets including monthly and quarterly season tickets through Smart Card has also been launched. "National Train Enquiry System" has been started in order to provide upgraded passenger information and enquiries. This system provides the train running position on a current basis through various output devices such as terminals in the station enquiries and Interactive Voice Response System (IVRS) at important railway stations. So far the project has been implemented at 98 stations.

Freight Operations Information System (FOIS) Computerisation of freight operations by Railways has been achieved by implementing Rake Management System (RMS). Such FOIS terminals are available at 235 locations Railways have established their own intra-net 'Railnet' It provides networking between Railway Board, Zonal Headquarters, Divisional headquarters, Production Units, Training Centers etc. Sterling Performance by PSUs The public sector undertakings of the Railways, especially IRCON and RITES, scored commendable achievements during the last three years. IRCON International has achieved a record turnover of Rs.900 crore during 2001-02 and the foreign exchange earnings of this prestigious organization has increased six fold over the years. At the international level, IRCON is at present executing different projects in Malaysia, Bangladesh and Indonesia. The PSU has registered a strong presence in the international scenario by its sterling track record. RITES, another prestigious PSU under the Ministry has scaled new heights in performance, profit and dividend to the shareholders during the last three years. Its turn over increased from Rs.172 crore in 1999 to Rs.283 crore in 2002. RITES for its sterling performance secured the prestigious ISO-9001 Certification this year. The company has also entered into export/leasing of locomotives in different countries in Asia and Africa. RITES is operating all over the world including Columbia, UK, Iran, Malayasia, Myanmar, Bangladesh, Sri Lanka, Tanzania, Uganda, Ethiopia, Turkmenistan and Uzbekistan.

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Indian Railways Finance Corporation Limited secured excellent rating for fourth year in succession by the Department of Public enterprises on the basis of the performance targets. Besides, Standards and Poor's, the international credit rating agency, also reaffirmed the sovereign ratings to IRFC. The Corporation has been making profits and paying dividends. Indian Railway Catering & Tourism Corporation (IRCTC) Internet based ticket booking has been launched by IRCTC in Delhi, Chennai, Bangalore, Mumbai and Calcutta this year. Hygienic and air-conditioned food plazas having consumer-friendly ambience opened at Pune and Chennai and license for similar plazas awarded for 17 more locations. In all, 50 such plazas will be opened by the end of this financial year across the zonal Railways. Railneer - packaged drinking water is to be made available from December this year. More than half a lakh tourists have availed the value added tour package programme launched by the Corporation this year.

E. Innovative Technologies by Konkan Railway

Konkan Railway Corporation (KRC), the technological marvel of Indian Railways, has invented quite a few new technologies. Anti Collision Device (ACD), state-of-art indigenous technology of KRC is currently under-going intensive field trials and is capable of avoiding collision between trains. Sky bus metro is another innovative, economic and eco-friendly mass rapid transportation solution devised by Konkan Railway. Self Stablising Track (SST) devised by KRC, which is undergoing trials at present, will help Railways run the fastest train in the near future and will make tracks much more safe and sustainable.

F. Private Sector Participation

The participation of both private and public sectors in developing rail infrastructure has gone up. A joint venture company was formed with Pipava Port authorities to provide broad gauge connectivity to Pipava Port. MoUs have been signed between Ministry of Railways and the State governments of Andhra Pradesh, Karnataka, Maharashtra, West Bengal, Tamil Nadu and Jharkhand in developing rail infrastructure in these States.

G. Telecommunication - New Trends

To give improved telecommunication systems on Railways, Optical Fibre based communication systems has been adopted and laying OFC has increased to 7,700 route kilometer this year. Rail Tel Corporation has been created to make a nationwide broadband multimedia network by laying optical fibre cable along the railway tracks. This system will provide better operational and passenger amenities and additional revenue to Railways.

H. Honours and Awards

Indian Railways achieved a number of recognitions and awards in sports, tourism sector and for excellence in operational matters. In the Common Wealth Games in Manchester, the Indian teams record performance has been mainly due to Railway team's excellence in sports. Except one member the entire women's Hockey team which bagged the gold medal belonged to Railways. Mohd Ali Qamar of Indian Railways has bagged gold medal for boxing and other participants from Railways helped India win medals in many a team events. A number of sportspersons from Railways were conferred with the coveted Arjuna Awards and other major sports awards.

I. Darjeeling Himalayan Railways attained the World Heritage Status from UNESCO.

Fairy Queen, the oldest functioning steam engine in the world, which finds a place in the Guinness Book of World Records, got Heritage Award at the International Tourist Bureau, Berlin in March, 2000. On operational front, Delhi Main station entered the Guinness Book for having the world's largest route relay interlocking system.

J. Social obligations and care for weaker sections

Senior citizens, students, disabled persons etc. enjoy concessional benefits from Railways. New initiatives in this area during the last three years include reduction of age limits for special concession to senior women citizen from 65 to 60 years, blind and mentally challenged persons can now travel in AC classes on confessional rates. Free second class Monthly Season Tickets (MSTs) for school going children upto tenth standard for travel between home and school was also introduced.

K. Tie-Up with Foreign Railways

Indian Railways is in constant touch with Railways across the world to bring in state-of-art facilities in its system. Towards this, a Memorandum of Understanding was singed during the Eighth Session of the Indo-Austria Joint Economic Commission held in Vienna. This seeks to promote and deepen long-term infrastructure-specific cooperation between Indian and Austrian Railways to

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their mutual benefit.A three-day International Conference of Union of Railways was organised by Indian Railways in New Delhi in which hundreds of delegates from various industries and Railways around the world participated

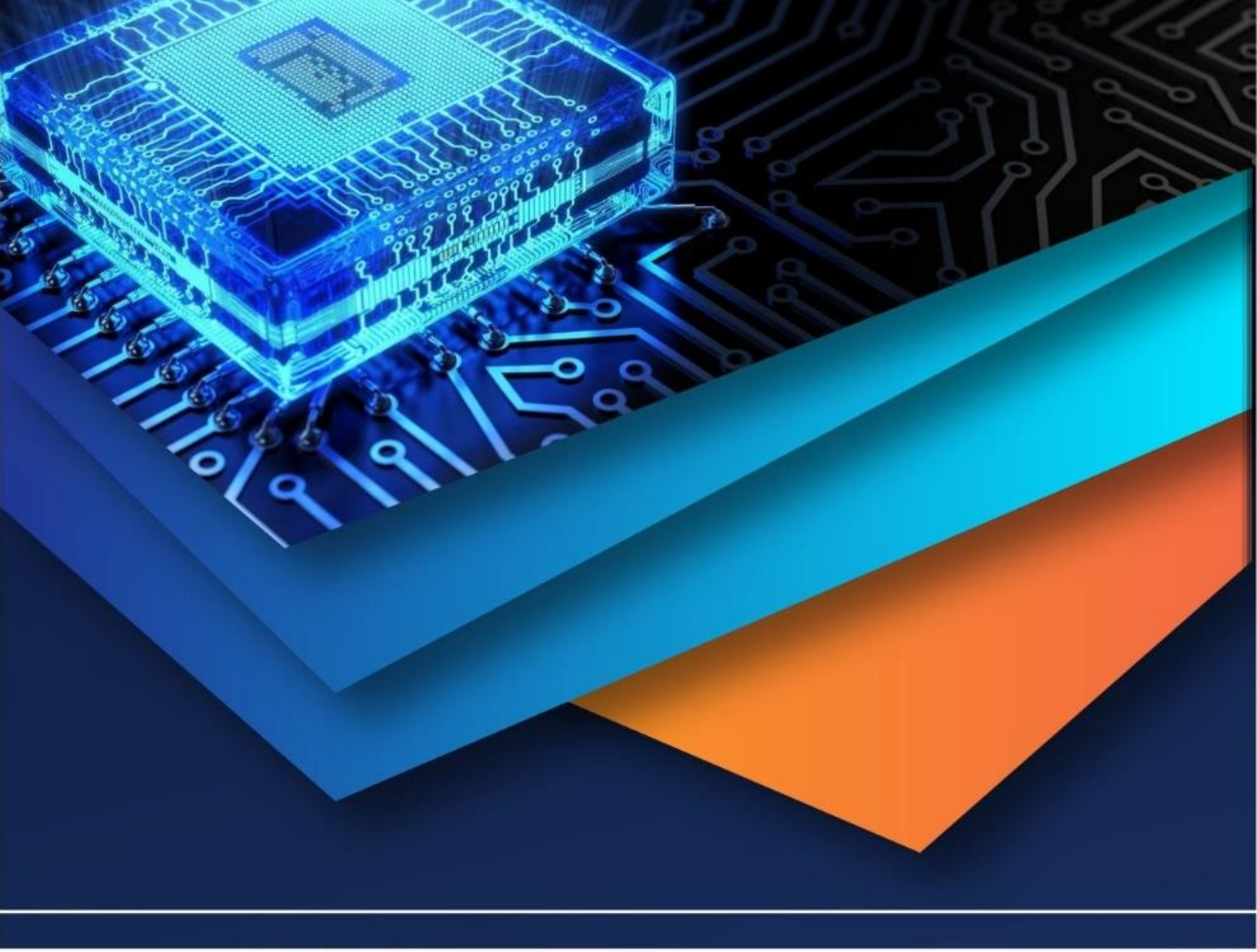
III. CONCLUSIONS

The railway system is a significant change in India over midst. Rail Road's which are laid by government and others are more importantly, by customers, to provide better service and to be more efficient. For any success, the main key in this world is very carefully planning, scheduling, implementing planned and new existing works without any disruption to other works. Even if we planned carefully, there would be some time deviations. The proven fit of most of the arrival delay times to logistic distribution, departure delays to a log-normal distribution. This allows an improvement in the design of timetable and more reliable forecast of train delays during operations. In this research mainly focus on suitable models of train delay propagation in stations.

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