



Duties of Railway for ensuring safety – A review

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Abstract

This chapter addresses the health and safety issues of existing mainline and light rail networks. In the light of the systemic emergence resulting from the interaction between all key elements of the railway network, the two main issues are discussed, namely infrastructure, rolling stock, resources and human components like staff, passengers and the railway adjacent. Modern train transport has moved away from their earlier ancestors' sluggish, noisy, polluting and poor safety records, providing the air traveler with speed, comfort, convenience and protection these days. It is primarily motivated by the introduction of many modern infrastructure technologies, rolling stock and operations, which include advanced on-board and track computing, high-speed communications, energy-efficient traction systems and new track materials.

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Introduction

Indian Railways, even a microcosm of India, is very unique and distinctive of nature. It is an immense challenge to build a secure and effective network. The railways are interdependent with the most dynamic and complicated aspects. Railway health is the ultimate result of the integration of its various components. A single error on the 64,600-km track that crosses a country with a deficiency of more than 9,500 local vehicles, 55,000 trains and 2,39 lakh vehicles that hold nearly 23 million and close to 2,7 million tonnes' per day of freight, a mistake or an act of incompetence by one of the thousands of rail moving signs directly linked to the railway landscape. In addition, the acts of sabotage by wrongdoers are taking place throughout the world.

The safety of operations and also protection of passengers by the Railways are therefore the most important consideration.

Review of Literature

(Prasad, 2013) studied “Literature Review Report on Work-Life Balance of Loco-Pilots (Railway Drivers) in India and found The road driver is subjected to a psychosocial and stressful working environment, including solitary work, minimal opportunities for social interaction and a high degree of responsibility (both safety and timetable-based) for running the train. Times and technical conditions (e.g. train type, track area) are essentially the prerogative of a railway driver's employer, which limits the driver's ability to determine how the job is done. Railways fail to carry out their jobs and family duties. Long hours, erratic jobs and heavy workloads are due to this struggle. Therefore, a family-work conflict for railway drivers may be a growing job stressor. This paper explores the quality of working life and the factors that lead to imbalances in Indian railways, which cause high probability of occurrence.

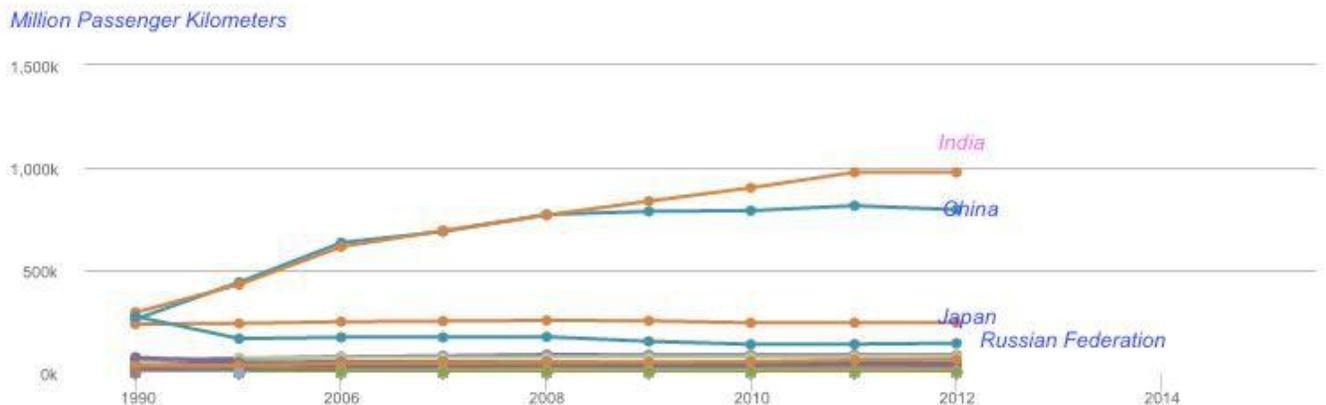
(Hale, 2000) studied “*Railway Safety Management: The Challenge of the New Millennium*” and found Transport statistics in all their forms indicate that we are still in an increasingly growing age. While some governments seek to discourage travel as a way to reduce road , rail and air traffic congestion, any mode is subject to annual growth of several percent. It is partially because of market globalization, creating even more transportation to deliver goods to high-consumption societies in the developing world, from cheaper labor economies. Globalization also creates many more business trips as multinational firms seek, in spite of the possibilities of data technology, to maintain hold of their territories, to make the message journey without any need.

(Nanajiwansnik, 2002) studied “*Original research paper Analysis of Railway Fatalities in Central India Introduction : Material and Methods : Corresponding Author : Observation* ” and found “The Department of Foreign Medicine & Toxicology, Indira Gandhi Government Medical College (Nagpur)”, conducted a two year retrospective report on fatal railway events. Fatality of the railway is 5.99% (Total 173) of all autopsies performed between January 2001 and December 2002 (n=2888). The deaths were mostly seen in males. The highest number of victims is 20-49 years old (n= 120 cases, 69.34 percent) in the age group. The average of the victims was 8.62:1. Many victim deaths were recorded at the site (96.53%). The largest number of accidental (91.32%) and inevitable suicides (8.68%) were found in the railways and none were registered as homicidal. Crush injuries have primarily been found on the lower limbs and then on the neck and head of the upper limb. The largest number of patients (84,38%) died as

a result of hemorrhages and shocks following organ injuries.(Zhu & Jia, 2018) studied “*The Research on Safety Management Information System of Railway Passenger Based on Risk Management Theory*” and found The criteria for the development of rail passenger safety are evaluated based on the theory of risk management and the PDCA process model. In order to manage the risk, an FTA safety evaluation team with Delphi is proposed to be developed, both from a qualitative as well as a quantitative point of view.

Railway: Safety and Security

“The Standing Committee on Railways (Chairperson: Mr. Sudip Bandopadhyay) submitted its report on Safety and Security in Railways on December 14, 2016”. Key observations and recommendations of the Committee include:



Source: “A Systems View of Railway Safety and Security By Ali G. Hessami”

1.) Institutional framework:

The Committee noted that each department determines its own asset protection criteria within railways. Each department focuses on its own safety issues. Nonetheless, ensuring protection in the sense of interdepartmental discrepancies or priority setting in intradepartmental protection may be difficult for Indian Railways. The Committee proposed the provision of health and protection through a separate department alone. For concentrate on railway safety activities, the Ministry of Railway should designate a member (health).

2.) Railway underinvestment:

The Committee noted that, while track kilometers were up 23% from 1950 to 2016, traffic by passengers and frequencies across the railway network rose by 1.344% and 1.642% respectively. The new network has been burdened by such a sluggish expansion of the rail system which has contributed to heavy congestion and secure hazards. In addition, underinvesting in rail has contributed to congested highways, inability to add new trains, decreased train speed, and a higher number of rail accidents.

3.) Crossing incidents at unmanaged levels:

The Committee noted that UMLCs were the biggest cause of maximum injury in rail accidents. Crossings at unmanaged level: The railway network currently consists of 14,440 UMLCs. Around 40% of the incidents in the UMLCs occurred in 2014-15 and about 28% in 2015-16. The Ministry did not meet the targets for removing UMLCs between 2010 and 2013. In addition, the goal of reducing UMLCs in 2014-15 has been decreased by around 50%. The committee recommended that certain interventions, such as Approaching Train Warning Systems, Train Enabled Warning Systems, be introduced to alert road users to a passing train.

4.) Derailment accidents:

The second highest cause for damages was between 2003-04 and 2015-16. In 2015-16, there were nearly 84% of derailment collisions. The flaw in the track or rolling material is one of the reasons for the derailment. 4,500 km should be renewed annually, of the total lengths of the road of 1,14,907 km across the world. For the currently scheduled renewal length for 5,000 km, however, the target was only to renew 2 700 km. The Committee also noticed that the coaches of the Linke Hoffmann Busch (LHB) are not more victimised as the coaches are not piling one another in the event of derailment. This proposed the complete conversion to LHB trains on Indian Railways.

5.) Incidents due to railway staff failure:

The Committee found that more than 50% of accidents are caused by railway staff deficiencies. Such delays include lack of care, inadequate maintenance, adoption of

shortcuts, non-compliance with existing safety standards and procedures. The Committee recommended that a routine rehabilitation plan be carried out for each group of railway workers. The course will provide case studies of incidents caused by common mistakes, working habits, restructuring and technical improvements.

6.) **Local pilot accidents:**

Accidents are often due to recording failures that are responsible for loco pilot (train operators). For rising traffic, loco-pilots experience a signal every kilometer and must be on alert continuously. In addition, loco pilots actually do not have any technical assistance, so they have to watch the signal vigilantly and thus monitor the train. Loco pilots are also overworked as they have to work past their normal working hours. The burden of work and exhaustion jeopardize the lives and health of thousands of commuters. The Committee recommended the provision of decent working conditions, improved medical services and other efficiency enhancements for local pilots and other relevant staff. Signal position can be shown accurately and can be related to visibility, distance and speed.

Duties of railway for ensuring safety

With the focus being placed on improving infrastructure on the tracks, provided that the trains will have to lift more source traffic in the next years. This cycle is ongoing, which has been shown by investments and interventions made in the past or by a decrease in the number of train accidents over the years.

- Periodic security audits by Zonal Railways and inter-rail safety audits of the various divisions have been performed regularly by multidisciplinary teams. “80 internal safety audits and 30 inter-rail safety audits have been conducted during 2011-12”.

- Training facilities have been upgraded for drivers, security guards and train staff. Modules for emergency management were updated, too. In 2011-12, there were 98,891 refreshing support workers employed in the health division.
- Vigilance Control Controller (VCD) is a device that automatically starts service when the driver does not perform a certain set of acts for a certain time. It was determined that this system would be mounted phased on the remaining electrical and diesel locomotives.
- AWS: The IR train protection system's experience has so far been largely limited to the AWS received on the Western-Central railway suburban parts of Mumbai in the 1980's. This system works efficiently.
- Block Proving Axle Counters (BPAC): BPAC is supplied at stations with centralized point and signal service to improve safety by automatically checking the full arrivals of the train. Until 31.08.201217, BPAC was commissioned for 3,580 blocks.
- There is a gradual change to flash butt soldering that is better than Aluminum Thermal (AT) welding.
- All rails and welds are ultrasonically tested according to the specified frequency. Cars used to detect rail defects are self-propelled ultrasonic rail monitoring (SPURT).
- Tie Tamping and ballast cleaning devices have been used increasingly for track maintenance. In addition, advanced track recording buses, buses and portable accelerometers are increasingly being used.
- There are two rail grinding machines. Rail grinding and rail lubrication have recently been implemented in order to improve rail life and reliability.
- Track geometry is electronically controlled for the identification of faults and maintenance plans.
- Modern bridge inspection and control system including non-destructive testing procedures, water testing, composite fiber covering, cartooning of uncertain foundations, integrity checking, etc. has been introduced.
- Patrolling railways, including night patrolling and increased patrolling during foggy weather, is performed routinely on vulnerable locations on the basis of threats from adverse weather conditions or external intervention. .

- The close Central Buffer Coupler (CBC) was increasingly fitted instead of the screw connection in new designer coaches by ICF to avoid the coaches falling onto each other in an accident unfortunate event.
- The design of passenger coaches with crash resiliency features to absorb much of their impact energy, without affecting the passenger area and the production of coaches are necessary.
- The suspension structures are upgraded with air springs at secondary stages that are able to maintain constant height in varying loads to improve stability and the reliability of passenger coaches
- The “Wheel Impact Load Detector (WILD)” is phased out¹⁸.

Conclusion

Health has been recognized as an significant concern and a special feature of railways. No rail network will survive by ignoring this crucial aspect as timely and secure transit is critical in today's highly competitive climate, not only for passenger traffic but also for materials. Over recent years, rail safety over major countries such as the US, Britain, Australia and the European Union have become an overarching concern. The trend is to ensure that safety is the highest priority for the operation of the railway network in those countries. The above scenario thus shows clear evidence of immediate steps towards improving Indian Railways' safety orientation and instilling a culture of non-accident tolerance⁴⁵. Indian Railways' ongoing efforts are to become the nation's leader in transport, by providing the nation's new, efficient, safe and customer-led services. Health is an ethos to which all rail operations and maintenance activities will adhere. This ethic must be promoted and nurtured. The health issues of the Indian Railways must be paramount.

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