STUDY OF ACCIDENTS IN INDIAN RAILWAY'S: A REVIEW

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Abstract

Study was carried out on the basis of data from 2001-2017 referring various research papers and Indian railway official accidental data. This paper considers all the available data of accidents in last 17 years and emphasized over the reasons of accidents. This paper also suggests various steps to prevent accidents so as to maintain smooth operations of Railways. Statistical analysis were conducted to examine the reasons of accidents. The analysis showed that Derailments are found out be main reasons of accidents in our study. But fact can't be denied that failure of railway staff founds out to be secondary cause of accidents and road vehicles users are responsible for the incidents at unmanned level crossings this are found to be main technological causes of accidents following up with collision among trains, fire in train, accidents involving animals.

Keyword: Unmanned level crossing, Derailments, Collision, Animals.

I. Introduction

Authorities as well as public always thought of Modernization and World-Class facilities in Indian Railways, but no one emphasizes on topic of accidents in Indian Railway. Indian Railway network is second largest network in world but fact can't be denied that is also tops in train accidents throughout the world. Having such a large network safety considerations cannot be let go. With massive utilization of assets, safety is of paramount importance for operational efficiency. Safety has to be considered as a top most priority in order to achieve greater height of performance.

Indian Railway is the largest network under a single management and it is the cheapest mode of transportation in the country. It is largest and busiest rail network in Asia, carrying over 18 Billion passengers and more than 2 million tonnes of freight daily. Indian railway network is spread over the length and breadth of the country and has 63000 route km (82,000 running track km) & 7000 stations. This huge task is achieved through use of 7700 locomotives 3800 passengers coaches& 2,20,000 freight wagon for which necessary maintenance & manufacturing facilities also exit.

II. Literature Review

[1]Government of India, Ministry of Railway, New Delhi, Feb 2015"Paper concludes that having congested network and finances are not easy to come by. Resources for development and replacement are stressed. It is finding it difficult to even meet its operational expenses. To make an attempt at resurrecting itself, Indian Railways has drawn up an ambitious five year action plan. Indian Railways will have to generate its own resources for its development. The next five years should change the face of Indian Railways. Faster trains, modern trains, swanky stations, skilled staff, should be the Railways of tomorrow. By 2020, IR would make all efforts towards delivering safe and punctual services, increase Average speed by 50% and increase loading to 1.5 billion tonnes. Indian Railways, like the mythical Phoenix, will rise again to scale new heights.

[2]Prachee Mishra,29/8/17"research concludes that the study over accident from 2003-2016 shows that Unmanned level crossing is found out to be the biggest cause of maximum causalities in rail accidents following up with derailments stood up 2nd highest reasons of rail accidents. Failure of Railway staff and loco pilot negligence are also the reasons for accidents. To reduce the frequency of accidents caused due to derailments The Standing Committee on Railways had recommended that audio-visual warnings should be implemented at level crossings to warn road users about approaching trains. These may include the Approaching Train Warning Systems and the Train Actuated Warning Systems. In the Union Budget 2017-18, elimination of all unmanned level crossings on broad gauge lines by 2020 has been proposed. One of the reasons for derailments is defect in the track or rolling stock. The Standing Committee had recommended that Indian Railways should switch completely to the Linked Hoffman Busch (LHB) coaches as they do not pile upon

each other during derailments and hence cause lesser casualties. For accidents due to failure of railway staff. The committee had recommended that a regular refresher course for each category of railway staff should be conducted.

[3]Railways and Wildlife: A Case Study of Train-Elephant Collisions in Northern West Bengal, India by Mukti Roy and Raman Sukumar this paper suggest that extensive network of the Indian Railways cuts through several forested landscapes, resulting in collisions of trains with a variety of wildlife species, including the largest land mammal– the elephant. In India, railway lines cross elephant habitats in several states, with accidents that resulted in more than 200 Elephant deaths between 1987 and 2015. As the 161-km Siliguri–Alipurduar track in the northern West Bengal state witnesses train– elephant collisions frequently, we developed a case study there with the objectives of mapping locations of collisions and generating a susceptibility map showing locations prone to accidents. We mapped elephant crossing points and movement paths along this railway track, as well as accident locations. Between 1974 and 2015, collisions occurred throughout the line, although there were several hotspots where elephant deaths were concentrated. A disproportionate number of accidents occurred during the night. Crop raiding in villages and train elephant accidents seem to be closely related, probably due to an increased frequency of elephant movement near or across this railway track during the cultivation season. Male elephants were much more prone to accidents, possibly because of behavioural characteristics that make them cross railway tracks more frequently. To reduce the frequency of accidents in this region, we recommend reducing the speed of trains, limiting the operation of trains during at night, provisioning overpasses and
underpasses, using communications technology, realigning a portion of the track, and fencing the track except for corridor areas.

[4]"Train accidents have declined in last 3 years:
Railway ministry**,**Aug 21, 2017 19:53 IST Press Trust of India, New Delhi/Mumbai"Reports states that in 2014-15, the number of accidents was 135 which decreased to 107 in 2015-16 and further to 104 in 2016-17 to the current year, train accidents decreased from 29 to 15 during the April-June span in comparison to the corresponding period of 2016, an improvement of 48.3 per cent, a ministry statement said. "Accidents per million train kilometres, an important index of safety , have come down from 0.23 in 2006-2007 to 0.10 in 2015-2016 and further to 0.09 in the year 2016-2017 despite a quantum increase in the volume of traffic carried by Indian Railways over the years," a report of senior railway official. While derailments have continued to be a thorn for the railways, with 63 such cases in 2014-2015, 65 the next year and 78 in 2016-2017, the largest transporter has eliminated 4258 unmanned level crossings (UMLC) in last three years, leading to drop in fatalities from UMLC accidents from 64 per cent of total fatalities in 2013-14 to 16.81 per cent in 2016-17.Investments for safety have increased from Rs 33,972 core per year during the UPA II to Rs 54,031 core every year under this government, a jump of 60 per cent. The average vacancy in safety positions during the period 2009-10 to 2013- 14 was 18.65 per cent of the total sanctioned strength. This has dropped down to 16.86 per cent in 2017 despite the sanctioned strength increasing by five per. The elimination of unmanned level crossings (UMLC) along broad gauge tacks in the next three-four years and the Train Collision Avoidance System (TCAS) Safety measures, including speedy track renewal, ultrasonic rail detection system, elimination of several unmanned level crossings on priority basis, a special safety fund, along with sophisticated the Linke Hofmann Busch (LHB) coaches with anti-climbing features would be implemented to reduce the railways accidents.

5 It has been observed that in year 2016 there were 106 train accident 92(86.79%) are due to human failure among those 54(50.94%) are due to railway staff failure and 38(35.85%) are due to other than railway staff failure these occurred at unmanned level crossings in which road users are found to be liable other than these equipment faliure2(1.84%) failure due to sabotage1(0.94%) Incidental factor 9(8.49%) causes not established 1(0.94%) combination of factor1(0.94%) these are found out to be reasons for accidents. Railway has taken safety measures such as safety action plan, periodical safety audit, trainingfacilities to ensure the safety other than these measures like complete track circulation, blockproviding, automatic block signalling, train protection and warning system, train collision avoidance system are being taken to avoid collisions. Likewise various steps like upgrading track structure, long weld rails and flash butt welding are taken to avoid derailment. Unmanned railway crossing are being provided with ROB, RUB, provison of subway, merger etc.

[6]"Indian Railways-Safety Performance by-Shri.Naushad Alam & Smt.Shalima Sharma" submitted the full fledge report of rail accidents from 2001-2016 which includes causes of accidents,casualties,collisions ,damage to rail property, accident compensation,statewise division of manned and unmanned railway crossing and the safety measures initiated by the Railway authorities. Report concludes that derailment and unmanned railway crossing are found to be the major reasons and safety measures which are been taken and also suggested what needs to be done to overcome the Rail accidents in future.

[7]"Scale & Severity of railway level crossing accident problem in selected countries of the region"reportstells that Indian railway network with a route length 62,495km has total 40,445km level crossing at an average of one every 1.5km, of this total 1612 crossing are manned with some form a barrier protection facing road users20,528 are open crossing with fixed road warning sings 948 are road crossing adjacent to canals without barrier protection with road warnings signs & 2837 are simple open crossing with nothing neither barrier protection nor final road warning. Systematic evaluation of level crossing safety performance & of justification for upgraded crossing protection is carried out by Indian Railways. Train vehicle unit is used as criterion for identifying which level crossing will

have priority of Up gradation. The TVU is known in India is identified to the traffic moment (TM) indicates applied in other countries that results from the manipulation of the daily road traffic volume at a level crossing by the daily number of trains passing through that crossings.

Table 1:Accidents

Year	Collision	Derailments	Level crossing	Fire	Misc.	Total	Train KM run in million	Incidents per million train KM
2000-01	20	350	84	17	2	473	723.8	0.65
2001-02	30	280	88	9	8	415	756.4	0.55
2002-03	16	218	96	14	78	353	786.2	0.44
2003-04	9	202	95	14	5	251	790.8	0.41
2004-05	13	138	70	10	3	234	810.14	029
2005-06	9	131	75	15	4	234	825.4	0.28
2006-07	8	96	79	4	8	195	847.8	0.23
2007-08	8	100	77	5	4	194	890.5	0.22
2008-09	13	85	69	3	7	177	905.2	0.20
2009-10	9	80	70	2	4	165	997.2	0.17
2010-11	5	80	53	2	1	141	1005.9	0.14
2011-12	9	55	61	4	2	131	1077.0	0.12
2012-13	6	49	58	8	-	121	1109.7	0.11
2013-14	4	53	59	7	3	117	1096.0	0.10
2014-15	5	63	56	6	5	135	1166.70	0.11
2015-16	3	65	35	0	4	107	1144.19	0.10
2016-17	4	70	16	0	0	90		

Table 2: Casualities

Year	Number of Passengers		Total Casualties per million passengers carried
	Killed	Injured	
2000-01	55	286	0.01
2001-02	144	595	0.01
2002-03	157	658	0.03
2003-04	135	302	0.03
2004-05	50	191	0.04
2005-06	315	627	0.165
2006-07	208	402	0.098
2007-08	191	412	0.092
2008-09	209	444	0.094
2009-10	238	397	0.08
2010-11	235	358	0.078
2011-12	100	586	0.083
2012-13	60	270	0.039
2013-14	42	94	0.02
2014-15	118	340	0.05
2015-16	40	126	0.02
2016-17	156	289	*

Table 3: Collisions and Derailments:

The position regarding total number & derailments and those caused by the failure of railway staff since 2000-2017 is given below

Year	No. of collisions & derailments	No. of collisions and derailments attributed to failure of railway staff	Percentage
2000-01	370	280	76
2001-02	310	-	-
2002-03	232	182	78
2003-04	211	143	68
2004-05	151	110	73
2005-06	140	106	78
2006-07	104	75	72
2007-08	108	75	69.44
2008-09	98	64	65.30
2009-10	89	57	64.04
2010-11	85	51	60
2011-12	64	48	75
2012-13	55	37	67.2
2013-14	57	44	77.19
2014-15	68	52	76.47
2015-16	68	53	77.94
2016-17	74	59	79.72

Table 4: Derailments

year	Total accidents	Derailments	Percentage
2000-01	473	350	75
2001-02	414	280	68
2002-03	351	216	62
2003-04	325	202	62
2004-05	234	138	59
2005-06	234	131	56
2006-07	195	96	49
2007-08	194	100	51.55
2008-09	177	85	48.02
2009-10	165	80	48.48
2010-11	141	80	56.74
2011-12	131	55	41.98
2012-13	122	49	40.16
2013-14	118	53	44.92
2014-15	135	63	46.67
2015-16	107	65	60.74
2016-17	90	70	77.78

III.Conclusion:

The Railway accidents from 2001-2017 has been studiedsuccessfully which shows that safety should be accorded as the highest priority by Indian Railways. Last 17 years of accidental studies reveals many facts such as not only Indian railway was responsible for the accident other than railway staff and railway mechanism, road siders were also responsible for rail accidents. Going through the data last 17 years it has been found that derailments and unmanned railway crossing are the main reason , through the cases of derailments are increased in last 6 years.

Indian railways have been working hard over the year to minimize the rail accidents. Safety fund had been increased in order to ensure the safety of each passengers travelling in train but still there are many flaws in rail system. Railway vacancies for safety related staff is increasing in engineering, mechanical, operating departments who are unable to fill the seats need to be filled up in order to minimize the burden over the existing rail staff and so as to maintain work efficiency of Railway employee in order to maintain smooth operations of railways. Various modern techniques should be inculcated by railway authorities that will ensure safety and minimize the number of rail accidents.

IV References:

[1] Government of India, Ministry of Railway, New Delhi, Feb 2015"

[2] Prachee Mishra report on accident,29/8/17

[3] Railways and Wildlife: A Case Study of Train-Elephant Collisions in Northern West Bengal, India by Mukti Roy and Raman Sukumar

[4] Train accidents have declined in last 3 years: Railway ministry,Aug 21, 2017 19:53 IST Press Trust of India, Mumbai"

[5] Safety by Indian Railways

[6] Indian Railways-Safety Performance by- Shri.Naushad Alam & Smt.Shalima Sharma"

[7] Scale & Severity of railway level crossing accident problem in selected countries of the region"