



A literature review: A glance of railways

¹ Anand Kumar Choudhary, ² Dr. Srinivas Rao

¹ Research Student, MATS University, Raipur, Chhattisgarh, India

² MATS School of Management Studies and Research (MSMSR), MATS University, Raipur, Chhattisgarh, India

Abstract

Rail transport is the means of conveyance of passengers and goods by way of wheeled vehicles running on rail tracks. In contrast to road transport, where vehicles merely run on a prepared, rail vehicles are also directionally guided by the tracks they run on. Rail is usually use for a fuel efficient transport mode, especially in comparison car, buses and trucks. It can contestably transport bulk of passenger and goods from one place to another place. In this literature paper discussed how many work fulfilled in railways department in Indian and foreign countries context.

Keywords: railways, literature review

1. Introduction

Rail Transport is the means of conveyance of passengers and goods by way of wheeled vehicles running on rail tracks. In contrast to road transport, where vehicles merely run on a prepared surface, rail vehicles are also directionally guided by the tracks they run on. The history of rail transport dates back nearly 500 years and include systems with man or horse power and rails of wood or stone. Modern rail transport systems first appeared in England in the 1820s. These systems, which made use of the steam locomotive, were the first practical forms of mechanized land transport, and they remained the primary form of mechanized land transport for the next 100 years. (History of Rail transport, 2010).

2. Literature Review

2.1 Indian Context Literature Review is Given Below

Shanmugam (1987) ^[61] study highlighted in general some aspects related to the marketing of railway services in Madurai and the behavior of passengers and users of goods traffic towards rail transport.

Promila Sharma and Harpreet Duggal (1989) ^[48] concluded that the most of the passengers were dissatisfied with the railway service on different namely catering, cleanliness and enquiry service. Most of the complainants did not use the redressal service provided by the Railway department because they did not expect any concrete action from Railways.

Vivekanandhan (1996) ^[57] study has pointed that the services provided by the Virudhunagar Goods shed satisfy its customers.

Nalini Devi (1996) ^[11] the study revealed that both the categories of employees have regular meetings with their subordinates, which is important to improve the performance of the subordinates.

Jeganathan (2002) ^[15] study has found that if season ticket fares are reduced for long distance travel, it will be an added attraction to the commuters.

Christoph Wolff (2001) ^[10], summarized that Indian Railways

must separate tangential areas, such as manufacturing and catering, from its core business of providing logistics service for freight customers and passenger service. India has the world's most vertically integrated rail system.

Rama Prasad (2002) ^[35] found that the more general compartments will be required for short distance travelers and it has been found that most of the passengers are not happy particularly with the quality of food. Quality of food should be improved and variety of items should be introduced.

Makesh (2002) ^[44] the objectives of the study were to measure the level of job satisfaction of employees of Indian Railways and to study the working conditions in the Southern Railways. Sonia Kolesnikov and Jessop (2003) ^[58] found that India has climbed aboard more enthusiastically than any country. The Deccan Odyssey features cars resembling a maharajah's palace, Royal Rajasthan on Wheels, offers even more luxurious accommodations that include a spa, a boardroom carriage and Wi-Fi Internet access.

Arpita Mukherjee and Ruchika Sachdeva (2004) ^[3] outline an efficient railway system lowers the cost of transportation, integrates people and markets across the country, links backward regions with the mainstream economy by opening them up to trade and investment, and thereby increases the overall productivity and global competitiveness of the economy.

Asian Business Review (2004) ^[5], outlined India is considered to be the latest Asian economy to reach "tiger" status, is spending billions of dollars with the help of the Asian Development Bank to upgrade its infrastructure. - Australian-Swiss locomotives for Indian Railways.

Ramesh Nanaji Wasnik (2004) ^[52] understood that railway authority must take some steps to prevent the accidents by acknowledging the safety engineering, training and awareness among staff, attentive surveillance, high quality maintenance and strict law enforcement.

Konkan Railway Corporation Limited (2004) ^[31] (A Government of India Undertaking) The interesting and

motivational advances in highway and railway crossing technology and operations, with over 38000 level crossings and complex nature of road traffic, India ranks better than many advanced countries in safety at level crossings with 0.10 accidents per million train Kms, surpassing France, USA and Japan etc.

John Gabriel and Suresh Babu (2005) ^[23] the study revealed that railways are setting up the computerized reservation centre's and have authorized out-agency bookings and hence all these facilities reveal the efficiency of reservation services of the railways and the study also revealed that the railways is the only organization providing maximum passenger reservation services to the travelling public most efficiently and effectively.

Sumathy (2005) ^[56] study pointed out that South India is noted for the large number of important Hindu festivals. Not less than 175 festivals are held annually at southern part of India. Special trains were operated during festival time. Temporary waiting halls, latrines etc., were provided at Kumbakonam and seventeen other stations on festival occasions. Special arrangements were made at Kumbakonam in 1933.

Vijay Durga Prasad (2005) ^[62] in this research various amenities provided by Indian railways at stations and on board are analyzed. He suggested enhance the quality of fast food items sold in the pantry car and at refreshment stalls on platforms, the design of the iron shutters of the window should be modified, fire extinguishers must be provided in each compartment and coach attendant and TTEs have to be trained to use them, Public Address System can be provided in all express trains, the same should be used for playing music for entertainment on board

Mathur (2005) ^[19] in this study men, machines, materials and money are the most important factors essential for the development and growth of industries.

Mudit kulsreshtha and Barnali Nag (2005) ^[41] in this paper they derived that long run structural relationships for all the three classes, viz. upper, second and ordinary second class, of non-suburban long distance passenger transport demand for Indian Railways using annual time series data for 1970-1995. The demand systems are found to be stable for all the classes in the long run and they converge to equilibrium in a period.

Chinmoy Kumar (2006) ^[9] the study revealed that the on-line reservation system was launched in August 2002 under the guidance of IRCTC (Indian Railway Catering and Tourism Corporation). The on-line reservation system was an extension of the from schedule time. Passenger reservation system (PRS) and served as an interface between the uses and the passenger reservation system. Another innovations of the Indian Railways were integrated voice response system (IVRS) unreserved ticketing system, National train enquiry system (NTES), tele-booking services and wireless services.

Raja (2007) ^[51] analyzed an empirical study about consumer image of Indian railways, the objectives of this study were to study the general image of the Indian railways and to study the specific image of the Indian railways related to the services before travel, services during the travel and services after the travel

Vijay Durga Prasad (2007) ^[63] the study were to analyze the passenger amenities provided by Indian railways at stations and on board the train in India in general and in Guntur

division in particular and to analyze opinion of selected sample passengers of Guntur railway division on various amenities provided by Indian Railways and also to suggest such measures and strategies that would go a long way for improvement of passenger amenities in Guntur division in particular and Indian railways in general.

Debabrata Das, Subhash Datta and Sharfuddin (2007) ^[13] the researcher attempts to devise a model to map a few of the most strategic location of Delhi using the available modes of public transportation i.e. bus and metro rail, based on distance, time and cost constraints. Research found to avoid congestion, best possible alternative route that should be taken as metro route at peak hours, and in case of travel cost consideration, metro route has higher travelling cost in comparison to bus route. The cost minimization can be possible by reducing waiting time and restructuring the travelling cost in case of metro rail.

Srivastava, Sharat S Mathur and Thompson SH Teo (2007) ^[8] this teaching case discusses the challenges being faced by the technology managers at Indian railways in the current scenario of a resurgent national economy coupled with increasing customer expectations. In the face of growing competition from road and low cost airlines, to retain its customers, IR (Indian Railways) has responded by changing its business rules. The current scenario needs to change the programming logic of PRS (Passenger Reservation System) has been making maintenance together for CRIS officials, they have realized that PRS is a time tested, proven, and reliable technology and they would be happy to replace the old PRS with a new state of art system that would provide them greater maintenance flexibility, the repercussions associated with possible failure of the new system are far too serious.

Anand K Sharma & Mathew J Manimala (2007) ^[2] outline that there were external as well as internal causes for the declining performance of Indian Railways. The budgetary support from the Central Government was dwindling and its financial situation did not allow higher budgetary support to the Ministry of Railways, besides the competition from road and air was increasing - Sustainability of The Indian Railways Turnaround: A Stage Theory Perspective

G. Raghuram Rachna Gangwar (2007) ^[49] states that IR needs to respond to the industry specific needs by interacting with them regularly. There is a potential for IR provided high capacity wagons, special purpose wagons, bigger train loads, closed circuit rakes and round the clock operations are given significant focus based on the customer specific requirements. Karan Kumar (2007-08) summarized Metro City Railway Stations like Delhi, Mumbai need to be modernized to provide world – class passenger amenities and services to the large multitude of passengers using these stations. IR is planning to do so by attracting private investments in the area by allowing the areas around the stations and the air space above platform to be commercially developed while operational/passenger.

Manmohan Parkash (2008) ^[37] summarized that railway industry has been transformed to face the challenges of a market economy. Such transformation includes a continuous restructuring of the organization and its working methods and the introduction of some of the most modern processes and techniques available adapted to best suit the situation in the PRC. The Railways of the People's Republic of China: An

Agenda for Action, Asian Development Bank, Publication Stock

Nick Thijs and Patrick Staes (2008) ^[46] suggests a platform for the exchange of views, experiences and good practices to improve the performance, competitiveness and quality of Indian railway.

Arpita Mukherjee (2009) analyzed that Mass rapid transport such as the DMRC (Delhi Metro Rail Corporation) built with government and private initiatives have increased speed, reduced congestions, and saved time and fuel. Prior to the DMRC, about 12 million people in the Indian capital commuted by buses and private transports. The DMRC has provided a comfortable and reliable mode of transportation at reasonable prices for the middle and low income groups.

Vivek Kumar and Vikas Rastogi (2009) ^[64] reveals Indian Rail transport is one of the major mode of transportation, so it must offer high comfort level for the passengers and the staff. However, the comfort that passengers experience is a highly complex and individual phenomenon. The improvement of passenger comfort while travelling has been the subject of intense interest for many train manufacturers.

Dan Bogart & Latika Chaudhary (2010) ^[12] analyzed that Indian railways experienced rapid TFP growth of 1.7 percent per year from 1874 to 1912. Moreover, we find no evidence of a decline in TFP relative to trend following state takeovers of private companies. Our estimation relies on a key feature of the institutional background whereby the former private railway companies were taken over by the Government of India at predetermined dates set by contracts negotiated in the 1850s and 1860s.

Muzammil Hanif, Sehrish Hafeez and Adnan Riaz (2010) ^[43] brings in the factors affecting customer satisfaction is of worth importance in order to know the reasons or the factors which are responsible to create satisfaction among customers for a better Indian railway sector.

2.2 Foreign Countries Context Literature Review is Given Below.

Zhang Ning (1996) ^[65] study pointed out the Railway service in Japan is very close to people's lives. In addition to providing safe, timely and speedy transportation, railways offer communities quick accessibility to shopping, entertainment, information, cultural activities and community services.

Jonathan Cowie and Geoff Reddington (1996) ^[25] the study examines the methods of assessing rail efficiency. The results suggest that the Danish railway is particularly efficient whereas the British system is one of the less efficient. The final conclusion is that efficiency on the railway is a product primarily of good management.

Glines de Rus, Vicente Inglada (1997) ^[16] in this study, an ex post cost-benefit analysis was carried out. The first high-speed link in Spain was launched in April 1992, with the high success according to occupancy rates and public opinion of its quality, safety, and impact on regional development. The main benefit obtained from HST are time savings obtained when users shift from slower transport modes and total gains from namely generated traffic.

Luisa Affuso, Jullien Masson and David Newbery (2000) ^[34] this paper contributes to the debate on investment in transport

infrastructure and the allocation of public funds for road and railway projects. Research suggest that road improvements have substantially higher returns than railway schemes, these findings cast doubt on the rationale of the new transport policy for the UK which proposes to allocate more public funds to the (private) railways than total new investment in strategic roads.

Pedro Cantos Sanchez (2000) ^[47] the objective of the study was the comparison of the efficiency levels for a set of European rail companies in monopoly situations with respect to hypothetical duopoly situation and to test whether the operating costs function of such companies is sub additive. The study revealed that at least for the companies of a greater size, an efficiency increase would be obtained from the separation of current companies in two different companies of a lower size. The study also revealed that the separated supply of passengers and freight transportation by different firms, at least for the European biggest companies would prove significant increases in the efficiency levels of rail industry.

Jon Shaw (2001) ^[24] the purpose of the study was to examine the promotion of competition in the passenger rail industry. Although there is little on-rail competition at present, the relaxation of regulatory and operational restrictions over the coming five years will present a number of new opportunities for market liberalization. Significantly, the regulator and franchising director have recently relaxed the two mechanisms used to limit inter Train Operating Companies (TCO) rivalry, 'moderation of competition' (MOC) and 'compulsory interavailability' (CI). In terms of competition for the market some commentators have argued that rail is very much in the ascendancy with unprecedented levels of growth expected. Such growth would impact very positively upon the outcome of future franchising rounds, the study revealed that, while on-rail competition has led to service innovations on certain lines, most improvements since privatization have had little to do with direct inter-TOC rivalry; rail tracks' station regeneration programme, rolling stock replacement and or refurbishment schemes and increases in train frequencies were all enacted during stage one of moderation of companies.

Koichi Goto (2001) ^[30] study has described the trends in seat reservation systems, automatic ticket machines in stations, automatic fare collection systems, automatic ticket checking machines, revolutionizing ticket systems using contact less IC cards and a guide system for visually impaired people is currently being developed. With this system IC chips programmed with location information are embedded in tactile used to mark paths for visually impaired people; this is read by a pocket-sized portable machine. The machine will guide him or her to the right platform by voice machines.

Richard Freling, Ramon Lentink and Albert Wagelmans (2001) ^[54] the purpose of the study was to analyze a decision support system for airline and railway crew planning. The system is a state of the art branch and price solver that is used for crew scheduling is crew planning for one or a few days that results in crew duties or pairings and crew rostering is crew planning for at least one week for individual crew members. the study revealed that the comparison with the integrated scheduling and rostering, that the way duties are built can have a huge impact on the quality of the rosters at the cost of a huge increase in computing time.

Hadi Baaj (2002)^[17] the purpose of the study was to develop options for the restructuring of the RPTA (Railway and Public Transport Authority) including the corporations of its bus operations. The study revealed that the restructuring of the RPTA to become planner and regulator of the sector, the regulatory plan allocating the private sector service providers into service areas by concession service via competitive tendering and the corporation of the RPTA's bus operations.

Russ Hauwood (2002)^[55] the purpose of the study was to analyze public policy aimed at promoting rail freight in Britain, but, unusually, the focus was on local rather than national policy. The study revealed that 'improve the integration of the road network with major transport interchanges so as to promote greater use of rail and water transport for freight'. The proportion of plans that contained references to rail freight grants and track access grants increased, although in both cases this was still a minority. To the extent that uptake of grants is influenced by local transport authorities there is therefore still considerable way to go in creating a supportive policy context.

Michiel Vromans, Rommert Dekkar and Jeo Kroon (2003)^[39] the purpose of the study was to examine reliability in public railway system. Reliability is one of the key factors in transportation both for passengers and for cargo. Reliability of railway services is a complex matter, since there are many causes for disruption and at least as many causes for delays to spread around in spare and time. One way to increase the reliability is to reduce the propagation of delays due to the interdependencies between trains. In this study attempt to decrease these interdependencies by reducing the running time difference per track section i.e., by creating more homogeneous timetable.

Kiyohoto Utsunomiya (2004)^[29] the purpose of the study was to estimate CPI (Consumer Price Index) railway fares, taking into account the improvement in the services provided by the railway industry; it also measures the real productivity growth of the railway industry in Japan. The study revealed that the improvements in the quality of the product offered by railway service companies suggested that there may be a significant degree of upward bias in the current CPI. This will lead to improve the measurement of price indices and productivity in service sectors. Although the analysis in this study was limited to railways, the approach shown in this study could be applicable to other transport modes.

Jain Boko (2004)^[20] the objective of this study was to present estimates of responsiveness of demand for service of railway passenger transportation with respect to chosen price and income elements using Slovenian data. Previous work on Slovenian railway transport has focused on analyzing management, infrastructure reorganization and ownership transformation to speed up Slovenia's integration into the European transport system and on methods of sales promotion. In estimating the demand functions for services of public railway passenger transportation within the country.

Bard Cole and Christine Cooper (2005)^[7] the study revealed that reliability and punctuality are the main concerns of rail users; the department for transport (DIT) concentrates on these issues, setting the train operating companies' targets which reflect one part of state's role in maintaining the overall condition for capital accumulation; that is in any capitalist

system. The DIT also produces performance indicators which relate to safety. The study also revealed that these indicators cast into darkness other safety issues which are of great concern to the public; track maintenance, increasing of crime levels at the unmanned station and phasing out and deskilling of train crew staff in SPAD (Signal Passed at Danger). This performance indicator does little to gain the trust of rail users.

Erhan Kozan and Robert Burdett (2005)^[53] the study revealed that sectional running time (SRT) has a major effect on any analysis of capacity because a small increase or decrease in this value can affect the level of capacity significantly. The percentage of total traffic that consists of each train and the percentage of travel in each direction are included in the SRT calculation because the capacity of a corridor is different for every distinct proportional and directional distribution.

Dennis Huisman, Leo Kroon, Ramon Lentink and Michiel Vromans (2005)^[14] the purpose of the study was to analyze the models and techniques used in railway transportation by passenger operators. In this study, the global planning problems occurring at the strategic, tactical, operational and short term planning level were discussed. The study revealed that in the coming years there will be less focus on the classical problems and more focus on some promising fields like reliability of timetables. In the rest of the operation research (OR) world, there will be research on real-time control. A combination of these two could significantly improve the performance of the railway operators and can lead to a successful third century of railway transport.

Richard Freling, Ramon Lentink, Leo Kroon and Dennis Huisman (2005)^[53] the purpose of this research was to aim at developing automated tools to support the planning processes of the shunting operations of a passenger trains operator. The process of parking trains unit, together with several related processes is called shunting. The study revealed that tracks can be approached from two sides; trains may consist of several trains units and a uniform way to deal with mixed arrivals and departures of trains. It also revealed that the models will be extended to support planners in several related planning processes, such as crew planning and the planning of cleaning and short-term maintenance of rolling stock.

Lena Wins Lott Hiselius (2005)^[32] The main purpose of this study was to investigate the potential of choice experiment (CE) for modeling preferences for changes in the exposure to hazmat transported by rail in order to assess the costs and benefits of different transport configurations. To the best knowledge of the author, this is the first time a CE study, using exposure as a proxy for probabilities and accident outcomes, has been carried out. Due to the novelty of the activity studied, special attention is given to the viability of the approach. The multi nominal logic model [MNL] is frequently used to estimate the utility function. Violations of the HA hypothesis are often observed, resulting in the need for more complex statistical models. This study suggested that the CE approach can be used to estimate people's preferences for different configurations of transport of hazmat by rail despite the complexity in the activity studied and in the CE method seems applicable even in this kind of setting with numerous difficulties. Furthermore, the analysis revealed that the CE approach may provide a rich description of people's preferences and the determinants of their preferences.

Marc Ivaldi and Catherine Vibes (2005)^[38] the objective of this study was to analyze inter and intra model competition in the transport industry. This model allowed evaluating the effects of both structured and regulatory changes on a particular market, to measure the impacts of either entry by a new rail operator or a change in the regulatory framework with the introduction of a kerosene tax and to measure the effectiveness of competition on a relevant market or to design marketing strategies. Three main passenger travel modes are available on this link: rail, road and air. Consumers choose a mode and an operator to travel on a given city pair and firms decide on service quality and prices. The study considered three standard dimensions of transport service quality: speed, frequency and capacity. The study revealed that leisure passengers are more attracted to train or car services than to airlines. The study also revealed that the effectiveness of competition on a particular market of transport services, need to account for all potential travelers, all modes and all firms and a small number of competitors is enough to create a high degree of competition.

Moshe Givoni (2006)^[40] the purpose of the study was to analyze the impacts of HST (High Speed Train) services. The main technical challenges in the development of commercial HSTs were to develop a train and track that could maintain stability and the comfort of passengers, maintain the ability to stop safely, avoid a sharp increase in operating cost and maintenance costs and avoid an increase in noise and vibration to areas adjacent to the line. The study revealed that the modern HST is best designed to substitute conventional railway services on routes where much higher capacity is required and to reduce travel time, further improving rail service also against other modes, therefore leading to mode substitution. However the high investment in HST infrastructure could not be justified based on its economic development benefits since these are not certain. Finally, the following definition for HST services was suggested high capacity and frequency railway services achieving an average speed of over 200kmph.

Karst Geirs, Rinus Haaijer and Bert Van Wee (2006)^[28] this study has three objectives. First it provides a definition and classification of economic benefit categories for public transport services and a review of existing applications of the option value of public transport services. Second, a survey instrument was developed that included stated choice experiments to elicit the willingness-to-pay (WTP) values for public transport of different qualities. Third, it applies the methodology in case studies to derive a first of WTP estimates for the option case of public transport services in the Netherlands. Public transport serves a number of public interests associated with the actual use of the services. The study revealed that option values may form a potentially relevant benefit category in public transport policy appraisal, additional to the use and non-use benefit categories typically included.

Leo Kroon, Ramon Lentink and Alexandar Schrijver (2006)^[33] in their study analyzed the shunting of passenger train units in Netherlands railways. A model for the train units shunting problem was described in this study. The model incorporates complicating details from practice, such as trains composed of several train units and tracks that can be approached from two

sides. The study provides a model for solving this shunting problem for general shunt track configuration, where train may consist of several units. The study revealed that the model is able to produce high quality solutions usually within reasonable amounts of computation time.

Jaspe Dekkers and Piet Rietveld (2007)^[22] the purpose of the study was to describe the innovative aspects and customer expectations of the services offered in electronic ticketing in public transport. The Nodded Mobile ticketing services (M-Ticketing) is an example of electronic ticketing in the Netherlands. People can book M-Tickets through the internet or by calling a voice response system and receive their M-ticket on their mobile phone through the Short Message Service (SMS). The study revealed that the consumers were satisfied with the service of M-tickets.

Hana Fitzova (2017)^[18] This paper endeavoured to evaluate the impact of the European railway reforms on the efficiency of railways in the EU on the basis of existing empirical studies evaluating the situation in EU countries. It also tried to identify the main factors making the impacts of these reforms difficult to measure.

3. Conclusion

In this paper literature paper discussed about the thirty two in Indian context and twenty four studies in foreign countries. These studies dealt with various aspects of Railways like, Traffic system, Personnel Management Practices, Speed of the train, Passenger Ticket reservation system, Effects of computerization of railway freight, Commuting Patterns in Metropolitan area etc. No Comprehensive study has been done on Passenger facilities provided by Indian Railways. This research gap has been identified by the researcher and undertook a detailed study on this vital theme.

4. Reference

1. Akiko Sakanishi. Commuting Patterns in the Osaka Metropolitan Area: A GIS-based Analysis of commuter Rail Passengers, *RURDS*. 2006; 18(1):45-48.
2. Anand K, Sharma, Mathew J. Manimala. The International Workshop on Innovation and Entrepreneurship held at Cankaya University, Ankara, Turkey, 2007.
3. Arpita Mukherjee, Ruchka Sachdeva. Trade in Land Transport Services: Railways, Indian Council for Research on International Economic Relations, International Transport Forum, 2004.
4. Arpita Mukherjee. Social Impact of Globalising Transport Services: The Case of India - Indian Council on International Economic Relations, International Transport Forum, 2010.
5. Asian Business Review. Australian-Swiss locomotives for Indian Railways, 2004.
6. Bansal RK, Sharma V. Study on some observations on the catering services in the Indian Railways, *Indian Journal of Community Medicine*. 1997; 22(2):82-85.
7. Bard Cole, Christine Cooper. Making the trains run on time: the tyranny of Performance indicators, production, Planning and Control. 2005; 16(2):199-207.
8. Srivastava Sharat C, Mathur S, Thompson SH Teo. Modernization of Passenger Reservation System: Indian

- Railwas, *Journal of Information Technology*. 2007; 22:432-439.
9. Chinmoy Kumar. Indian Railway; IT Innovations in Passenger Services, *the ICAFI Journal of Service Marketing*. 2006; 4(1):64-71.
 10. Christoph Wolff. Getting India's railways on track, McKinsey Research Report, 2001.
 11. Nalini Devi DV. A Study of Personal Management Practices in South Central Railway and the Perceived Effectiveness of Its Operations by the Passengers, *dissertation submitted to Osmania University*, 1996.
 12. Dan Bogart, Latika Chaudhary. State Ownership, Productivity and Colonialism: The Case of Indian Railways, 2010.
 13. Debabrata Das, Subhash Datta, Sharfuddin A. Importance of Metro Rail in Public Transport Network: A case study of Delhi, *Indian Journal of Transport Management*, 2007, 223.
 14. Dennis Huisman, Leo Kroon, Ramon Lentink, Michiel Vromans. Operations Research in Passenger Railway Transportation, *Statistica, Nedherladica*. 2005; 59:467-497.
 15. Jeganathan G. Commuters of Railways-An Attitude Study with Special Reference to Thirunelveli- Nagercoil Section, *Ph.D. thesis submitted to Manonmaniam Sundaranar University*, 2002.
 16. Glines de Rus, Vicente Inglada. Cost benefit analysis of the high speed train in Spain, *The annals of Regional Sciences*. 1997; 31:175-188.
 17. Hadi Baaj. Restructuring the Lebanese Railway and Public Transport Authority (RPTA) from losing operator to effective regulator, *Transport Review*. 2002; 22(1):103-113.
 18. Hana Fitzova. European railway reforms and efficiency: Review of evidence in the literature, *Review of Economic Perspectives – Narodohospodarsky Obzor*. 2017; 17(2):103-120.
 19. Mathur JS. Human resource management in Indian railways – A study of recruitment, training and motivation, *Southern Economist*, 2005, 23-25.
 20. Jain Beko. Some evidence on elasticity's of demand for services of public railway passenger transportation in Slovenia, *Eastern European Economics*. 2004; 42(2):63-85.
 21. Jamie Dallen. Sustainable Transport, Market Segmentation and Tourism: The Looe Valley Branch Line Railway, Cornwall, UK, *Journal of Sustainable Tourism*. 2007; 15(2):180-197.
 22. Jaspe Dekkers, Piet Rietveld. Electronic ticketing in public transport: A field Study in a rural Area, *Journal of intelligent Transportation systems*. 2007; 11(2):69-78.
 23. John Gabriel, Suresh Babu. Passenger reservation system in the Indian railways, *The Journal of institute of Public Enterprise*. 2005; 28(1&2):77-84.
 24. Jon Shaw. Competition in the UK Passenger Railway Industry: Prospects and Problems, *Transport Reviews*. 2001; 21(2):195-216.
 25. Jonathan Cowie, Geoff Reddington. Measuring eth efficiency of European railways, *Applied Economics*. 1996; 28:1027-1035.
 26. Ramamoorthy K, Ponnuraj S. Passenger perception of Omnibus services –An analysis, *Indian Journal of Transport Management*, 2001, 555-573.
 27. Karan Kumar. Sustainability of the Indian Railways Turnaround: A Stage Theory Perspective, Centre for Civil Society, CCS Working Paper no. 182, Summer Research Internship Programme, 2007-08.
 28. Karst Geirs, Rinus Haaaijer, Bert Van Wee. Opinion Value of Public Transport Meth for measurement and case study for Regional Rail links in Netherlands, *Transport Reviews*. 2006; 26(5):613-643.
 29. Kiyohoto Utsunomiya. CPI quality adjustments and productivity growth: Railway services in Japan, *Review of income and wealth*. 2004; 50(3):411-428.
 30. Koichi Goto. Passenger Service Technologies, *Japan Railway and transport Review*, 2001.
 31. Konkan Railway Corporation Limited. Cost Effective System for Railway Level Crossing Protection, Konkan Railway, 2004-2004.
 32. Lena Wins Lott Hiselius. Using Choice Experiments to Assess People's Preferences for Railway Transports of Hazardous Materials, *Risk Analysis*. 2005; 25(5):1199-1213.
 33. Leo Kroon, Ramon Lentink, Alexandar Schrijver. Shunting of passenger Train Units: An Integrated Approach, *Transportation Science*, 2006, 1-29.
 34. Luisa Affuso, Jullien Masson, David Newbery. Comparing investments on new transport infrastructure Roads vs. Railways? *University of Cambridge, Working paper*, 2000, 16185.
 35. Rama Prasad MV. A Study on Passenger Amenities in Railways, *Indian Journal of Marketing*, 2002.
 36. Madhavaiah C, Durga Rao S. Public Sector Road Transport Corporations: A Comparative Study of Service Quality Perceptions, *the ICAFI Journal of Service Marketing*. 2007; 5(1):31-41.
 37. Manmohan Parkash. Public-Private Partnership in Indian Railways, Centre for Civil Society, CCS Working Paper No. 182, Summer Research Internship Programme, 2008.
 38. Marc Ivaldi, Catherine Vibes. Intermodal and Intramodel Competition in Passenger Rail Transport, *Transportation Science*, 2005, 1-15.
 39. Michiel JCM, Vromans, Rommert Dekkar, Jeo Kroon G. Reliability and Heterogeneity of Railway Services, *ERIM report series research in Management*, 2003, 1-23.
 40. Moshe Givoni. Development and impact of the modern high speed train, *Risk Analysis*. 2006, 26(5):593-611.
 41. Mudit Kulsreshtha, Barnali Nag. Structure and dynamics of non-suburban passenger travel demand in Indian railway, *Transportation, Kluwer Academic Publishers, Netherlands*, 2005, 221-241.
 42. Murty MN, Kishore Kumar Dhavala, Meenakshi Ghosh and Rashmi. Singh Social costs benefit analysis of Delhi Metro – 2006, *Institute of Economic growth, working paper*, 2006.
 43. Muzammil Hanif, Sehrish Hafeez, Adnan Riaz. Factors Affecting Customer Satisfaction, *International Research Journal of Finance and Economics*, 2010.
 44. Makesh N. A study on job satisfaction of employees of Indian railways: the case of southern railway with

- particular reference to the FrontLine Staff, *M. Phil dissertation to Madurai Kamaraj University*, 2002.
45. Nanda kumar Mekoth. Quality of service in passenger Road Transport: A comparison between public and private sectors with reference to Goa, *Indian Journal of Transport Management*, 1997.
 46. Nick Thijs, Patrick Staes. Primer on Customer Satisfaction Management, European Institute of Public Administration, 2008.
 47. Pedro Cantos Sanchez. A Sub additivity test for the cost function of the principal European Reviews. 2000; 26(3):275-296.
 48. Promila Sharma, Harpreet Duggal. Grievance Redressal in Indian Railways, *Consumer Confrontation, CERC*, 1989, 5-7.
 49. Raghuram Rachna Gangwar G. Marketing Strategies for Freight Traffic on Indian Railways - A Systems Perspective - Indian Institute of Management Ahmedabad, India - Research and Publications, 2007.
 50. Rainald Borck, Matthias Wrede. Commuting Subsidies with Two Transport Modes, *Transport Reviews*, 2007, 1-13.
 51. Raja S. Consumer Image of Indian railways – An Empirical Analysis, *SMART Journal of Business Management*. 2007; 3(2):59-63.
 52. Ramesh Nanaji Wasnik. Original research paper Analysis of Railway Fatalities in Central India - *J Indian Acad Forensic Med*, 2004.
 53. Richard Freling, Ramon Lentink, Leo Kroon, Dannis Huisman. Shunting of passenger train Units in Erhan Kozan and Robert Burdett–A Railway capacity Determination Model and Rail Access Charging methodologies, *Transport Planning and Technology*. 2005; 28(1):27-45.
 54. Richard Freling, Ramon M Lentink, Albert Wagelmans PM. A Decision support system for crew planning in passenger transportation using a flexible branch and price algorithm, 2001.
 55. Russ Hauwood. Evaluation of the policies in British Local Transport Plans with regard to the promotion of rail freight, *Transport Reviews*. 2002; 23(4):387-412.
 56. Sumathy S. history of Southern Railways, *M.Phil. Dissertation submitted to Bharathidasan University*, 2005.
 57. Vivekanandhan S. A Study of Goods Traffic Services Provided by Southern Railways – with Special Reference to Virudhunagar Goods Shed, *M.Phil. Dissertation Submitted to Madurai Kamaraj University*, 1996.
 58. Sonia Kolesnikov, Jessop. The Rails Less Travelled, Corporate Resource Net, 2003.
 59. Sudip Roy, Datta. Ranking of public transport Modes According to the characteristics of abstract nature in Kolkata, *Indian journal of Transport Management*. 2005; 29(2):136-143.
 60. Vijaya Raghavan TAS. Service Quality perceptions of Transport services – The case study of state road transport undertakings, *Indian Journal of Transport Management*, 1997, 375.
 61. Shanmugam TR. Marketing of Railway Services-A Study of Passenger and Goods Traffic in Madurai, *M.Phil. Dissertation submitted to Madurai Kamaraj University*, 1987.
 62. Vijay Durga Prasad V. had made a study of Passenger amenities in Indian Railways with reference to Vijayawada Division, *Indian Journal of Marketing*, 2005, 15-21.
 63. Vijay Durga Prasad V. Passenger Amenities of Indian Railways: A study of Guntur Division of South Central Railway, *Journal of Contemporary Research in Management*. 2007; 2(3/4):103-113.
 64. Vivek Kumar, Vikas Rastogi. Investigation of vertical dynamic behaviour and modelling of a typical Indian rail-road vehicle through bond graph, *World Journal of Modelling and Simulation*, 2009.
 65. Zhang Ning. Railway Service Close to People’s Lives, *Japan Railway and Transport Review*, 1996.
 66. https://en.wikipedia.org/wiki/History_of_rail_transport_in_Belgium.