CHAPTER II

REVIEW OF LITERATURE

A review of literature places a research study in its proper perspective by showing the amount of work already carried out in the related areas of the study. Any effective research must be based upon past-knowledge that helps to eliminate the duplication of what has already been done and provides useful and significant data for research. The amenities provided with the passengers by the Indian Railways has attracted the attention of many researchers these days due to its recognized importance. A brief review of selected studies with their scope and objectives may be useful for understanding the present scenario of amenities provided by the Indian Railways.

Shanmugam [1987]\(^1\) in his study titled, “Marketing of Railway Services-A Study of Passenger and Goods Traffic in Madurai” has highlighted in general some aspects related to the marketing of railway services in Madurai and the behaviour of passengers and users of goods traffic towards rail transport.

Promila Sharma and Harpreet Duggal (1989)\(^2\), in their article titled, “Grievance Redressal in Indian Railways” have reported that most of the passengers were dissatisfied with the railway service on different fronts 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)\(^3\) in his study “A Study of Goods Traffic Services Provided by Southern Railways – with Special Reference to Virudhunagar Goods Shed” has pointed that the services provided by the Virudhunagar Goods shed satisfy its customers.

Nalini Devi [1996]\(^4\) “A Study of Personal Management Practices in South Central Railway and the Perceived Effectiveness of Its Operations by the Passengers” 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. The regularity of the superiors meeting the subordinates depends on span of control. It is observed that the span of control is sufficient as expressed by majority of the employees. The recent observation that the expenditure incurred by SCR has increased from the year of inception to terminal year drastically indicates that SCR is becoming more quality conscious and seeks to provide comfort and security to its passengers.

\(^4\) D.V.Nalini Devi  "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
Bansal and Sharma [1997]⁵ analysed a study about the catering services in the Indian Railways, the objective of this study was to observe and analyse the catering service of the dining cars and to correlate it to the hazards that may accrue with consumption of contaminated food. The study revealed that the infrastructure of the railway dining cars, the hygienic practices observed by the food handled and the entire catering process from storage of unsatisfactory and fraught with health hazards. Almost all the model regulations for food safety had been flouted. The study also revealed that there is no detailed ‘modus operandi’ for the monitoring and surveillance of the catering operations of the dining cars, which were potentially conducive to the transmission of food-borne infections.

Vijaya Raghavan [1997]⁶, expresses the need for service marketing approach to public road transport is emphasized based on a few diagnostic studies carried out earlier and a framework is developed based on the lines of Parasuraman, Zeithaml and Berry model of service quality gap and their refined SERVQUAL methodology is applied in the case of an urban city transport undertaking. In SERVQUAL instrument, the principal dimensions used to judge the quality of services are: Tangibles, Reliability, Responsiveness, assurance and Empathy. While the challenge

⁵ Bansal R.K., Sharma V. – “Study on some observations on the catering services in the Indian Railways” - Indian Journal of Community Medicine, April- June 1997, vol.22, No.2, pp 82 to 85.
confronting the STUs knows these service quality; gap perceptions, the bigger challenge is actually planning to pug these gaps.

Nanda kumar Mekoth [1997] had made a study on “Quality of service in passenger Road Transport: A comparison between public and private sectors with reference to Goa”. This study evolves a method to measure the quality of service of passenger road transport service as perceived by the customers. To establish a positive relation, between the results of the measurement of quality of services using both the approaches so as to prove that the customer perception is related to actual service performance.

Fareed, Karim and Chandrasekhar analyzed in their study about Characteristics of non-bulk commodity transport and shipper’s Perception – A model share prospective. Freight transportation becomes imminent because the production and consumption centres are spatially separated. At present, it is found that railways are catering for the domestic freight in any country with marginal share by other modes. In India, Road and Rail are the main modes for commodity movement with marginal shares by sea and air. It is generally observed that railways are suitable for moving bulk traffic while roadways are preferred for high valued packages for short and medium distances. Only small percentage of the freight carried by the

railway is non-bulk commodities. The non-bulk commodities which are small percentage generally consist of small weight shipments and parcel services of individual shippers, these shippers have the mode of choice between the roadways and railways and hence they are considered for modelling. Bulk or non-bulk commodities moved through transport companies constitute the road share. These transport companies carry bulk commodities as per contracts and tenders from big industries and companies on yearly basis. These industries and companies ship their commodities only through these transport companies, and hence have no other mode as choice. The study revealed that 75% of the shippers are road shippers and remaining 25% are rail shippers. It also revealed that the total number of shipment km of both the modes are almost same, even though road mode caters to more number of shipments and the average length haul for rail is 820km and for road 375km. The study also revealed that road shippers give transit time, reliability of schedules, availability of capacity, frequency of service, and freight rate, more weights than rail shippers.

Ramamoorthy and Ponnuraj [2001]9 in their study aim at “Passenger perception of Omnibus services –An analysis “. The study indicates that an efficient transport system is essential for the movement of both goods and passengers. The omnibuses are however a refreshing contrast to the government-owned buses. The omnibus

operators constantly endeavour to improve the quality of their services. They aim at passenger comforts and keep their buses clean and well-maintained. Breakdowns are very rare in their operations. Above all they are time-conscious. Though they charge higher fare, the public patronize them as their service is much better than the ones provided by the state owned buses. In this direction, the prescribed criteria with some of the proven methods of analysis are brought forward through this article.

Jeganathan(2002)\textsuperscript{10} in his study, “Commuters of Railways-An Attitude Study with Special Reference to Thirunelveli- Nagercoil Section” has found that if season ticket fares are reduced for long distance travel, it will be an added attraction to the commuters.

Rama Prasad(2002)\textsuperscript{11} in his article, “A Study on Passenger Amenities in Railways” has found that more general compartments will be required for short distance travellers 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]\textsuperscript{12} conducted a study on “A study on Job satisfaction of employees of Indian Railways: The case study of Southern Railway with particular reference to the front line staff”. The


\textsuperscript{12}N.Makesh-“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
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. He suggested the following: As promotion chances are very remote in Railways, periodic promotion should be given to the staff to make them evince interest in their jobs. The participation of more employees must be encouraged while making decisions. Relationship between officers and employees in lower cadre must be smooth and harmonious. Performance be recognized and appreciated with good incentives. installation of equipments of the latest technology in enquiry counters like overhead microphone to answer on-line queries should be done; works like chart enquiry, phone enquiry, personal enquiry, manning of gate should be divided among the staff. Canteen facilities should be improved; Crèches must be in operation for the women staff to enable them to leave their babies while working. Grievance cell should be opened to redress the grievance of the employees. Union activities should be regulated.

John Gabriel and Suresh Babu [2005] undertook a study about the passenger reservation system in the Indian railways. The objectives of the study were to determine the efficiency of passenger reservation services in the Indian railways system and to examine whether the existing system of railway reservation is really efficient in satisfying the needs of the travelling public, and whether any change or alteration in the existing system could bring about a perceptible

improvement of the services. The study revealed that railways are setting up the computerized reservation centres 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)\textsuperscript{14} in her project titled” history of Southern Railways”, has 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. Six sheds each containing a booking office were provided for pilgrim passengers. Each shed was for a group of stations and special timetables were drawn out and issued well in time. About 46,000 passengers were transported.

Vijay Durga Prasad [2005]\textsuperscript{15} conducted research under the title, “A study of Passenger amenities in Indian Railways with reference to Vijayawada Division”. In his research various amenities provided by Indian railways at stations and on board are analysed. He suggested

\textsuperscript{14} S.Sumathy - ”history of Southern Railways”,M.Phil. Dissertation submitted to Bharathidasan University, August, 2005.

the measures and strategies that would go a long way for improvement of passenger amenities in Vijayawada Division in particular and Indian railways in general are, the authorities have to take suitable steps to 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. Strong mesh-type window shutters with bigger holes or shutters with a provision to see through the window without opening should be provided; 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] had made a study on “Human resource management in Indian railways – A study of recruitment, training and motivation”. In his study men, machines, materials and money are the most important factors essential for the development and growth of industries. Of these the human factor or man stands foremost and constitutes the basis for successful working of any undertaking. The overwhelming significance of this factor is due to its unique characteristics. First, man alone can produce through motivated creativity an output greater than the sum of his inputs. Second, this resource is animate, active and living. Third, human resource is most complex and unpredictable in its behaviors. Fourth, each individual

has his or her own distinct background. Finally, it is only this resource which appreciates in value with the passage of time. So the Indian railways has set up a separate department for human resource to advise, guide, and serve in matters connected with human resource management.

Sudip Roy and Datta [2005] undertook a case study about ranking of public transport modes. According to the characteristics of abstract nature in Kolkata, the identification of model attributes is a complicated task as most of them are interrelated to each other. In the present study seven model attributes are chosen viz, fare, travel speed, waiting time, comfort, reliability, availability and safety feeling. All the attributes assumed here are of abstract in nature and have their numerical values in ordinal scale and are to be determined through users’ assessments. The study revealed that respectively and with regards to travel speed attribute the special bus has been ranked as the most satisfying mode. The study also revealed that the waiting time for ordinary buses has been considered to be minimum and that auto-rickshaw being third in position and the reliability of a transit mode depends upon the degree of deviation of actual journey time from schedule time.

Murty, Kishore Kumar Dhavala, Meenakshi Ghosh and Rashmi Singh [2006] presented a working paper to Institute of Economic Growth Delhi University. In this paper the growing demand for public transport in mega cities has serious effects on urban eco-system especially due to the increased; atmospheric pollution and changes in land use pattern. The introduction of CNG in certain vehicles and switching over of some portion of the transport demand to the metro-rail have resulted in a significant reduction of atmospheric pollution in Delhi. The Delhi metro provides multiple benefits: Reduction in air pollution, Time saving to passengers, Reduction in accidents, Reduction in Traffic, Reduction in congestion and fuel savings. There are incremental benefits and costs to number of agents.

Chinmoy Kumar [2006] undertook a study about Indian Railways-IT Innovations in passenger services. The purpose of the study was to provide an insight into the various cost saving innovations that were adopted by the Indian Railways in improving and advancing their passengers’ services. The progressive implementation of information technology served as a thrust towards better responsiveness to the raising passenger demands. The study revealed that the on-line reservation system was launched in August 2002 under the aegis of IRCTC (Indian Railway Catering and Tourism Corporation). The on-line reservation system was an extension of the


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. The study revealed that the cost of maintenance and expansion of the railway infrastructure was enormous. The study also revealed that the progressive implementation served as a thrust towards better responsiveness to the rising passenger demands.

Madhavaiah and Durga Rao [2007] undertook a comparative study of service Quality perceptions in public sector transport corporations. The objectives of the study were to examine customer perceptions of services provided by public sector road transport corporations of two south Indian states and to assess the effectiveness of existing measures of service quality in predicting customer satisfaction and intention to repatronize the services. The analysis dealt with how well the service perception (SERVPERF) measures exhibited reliability when used in passenger road transport services of Andhra Pradesh passengers and Tamilnadu. The study revealed the Andhra Pradesh passengers are generally more satisfied with their public sector road transport service than Tamilnadu customers on most of the SERVPERF dimension. Tamilnadu passengers are generally more satisfied with “knowing when the buses arrive and depart” as

well as the information provided by the transport corporation at the bus stop, whereas Andhra Pradesh respondents were generally satisfied with their transport corporation’s frequency of service, cleanliness of the bus interior and safety at bus stops. The results indicated that Andhra Pradesh customers think of service reliability and ease of using the service as the key factors determining the passenger road transport service quality. The study pointed out several key variables that determine customer intention to repatronize the transport corporations. Those variables are reliability and empathy for Andhra Pradesh passengers and reliability of Tamil Nadu passengers. The results of this study suggest implementing service standardization across different states can be risky while operating inter-state services.

Raja [2007] 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. The study revealed that regarding general performance of the Indian railways, out of 200 respondents, 166 (83%) have expressed a positive attitude, 34 (17%) remained neutral and none has recorded a negative attitude and as regards the level of satisfaction, 160 (80%) have stated the level of satisfaction as ‘below 100%’, while 40 (20%) have given the level as

‘above 100%’. As such, the Indian railways offer more than what is expected of it by the passengers. The study also revealed that 200 respondents, 194 (97%) have expressed positive feeling that it is safe to travel by train, while 192 (96%) have got positive opinion about comfortability of journey. 180 (90%) have stated that it is economical to travel. 156 (78%) are of the opinion that there is courteous service by the employees. 180 (90%) have expressed that the Indian railways has been functioning efficiently.

Vijay Durga Prasad [2007]²² undertook a study about passenger amenities of Indian railways in Guntur division of south central railway. The objectives of 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. The study revealed that around 48% of the respondents have poor opinion on the supply of water in trains. Some of the passenger opined that the water supply is not continuous. Some opined that water has some foul smell thereby becoming useless for utilization. A large group of respondents opined that the cleanliness of train compartments is poor. The passengers

expressed that the compartments are not cleaned and maintained properly and regularly. It causes discomfort to passengers while on travel. The respondents are asked to opine on the privatization of catering, sanitation and pantry car facilities. A considerable group of passengers opined that security arrangements have to be improved at station, on train and particularly during night times. The study also revealed that a very large group of respondents (74%) expressed that they are satisfied with the amenities provided by Indian railways.

Debabrata Das, Subhash Datta and Sharfuddin [2007] conducted a study on “Importance of Metro Rail in Public Transport Network: A case study of Delhi”. 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. The Floyds’ algorithm determines the most optimum mode of travel between any two locations. In the research they 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.

Abdul Sameem Ansari [2007]24, in his paper entitled “Road users perceptions on the Traffic management in Hyderabad”. The present article highlights the road users perceptions like a) mode and distance of travel  b) description of routes  c) traffic jams  d) attitude of traffic police  e) signalling system  f) intersections operated by traffic personnel  g) hurdles in the management of traffic  h) traffic obstructions. In Hyderabad, the number of vehicles, population, and mode of transport have been increasing abnormally and hence the traffic enforcement division should gear itself efficiently to meet the new challenges in the area of traffic management.

Srivastava, Sharat S Mathur and Thompson SH Teo 25 aimed to give “Modernization of Passenger Reservation System: Indian Railways’ dilemma”. 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 has responded by changing its business rules. The current scenario needs to change the programming logic of PRS 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.

Mudit Kulsreshtha and Barnali Nag 26 has presented a paper on “Structure and dynamics of non-suburban passenger travel demand in Indian railway” to Kulwer Academic Publishers, Netherlands. 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. Any disequilibrium in the long-run with adjustments in passenger transport demand and the price variable, i.e. real rate charged per passenger kilometre. Results show that travel demand in all classes would rise with income, although the rise is less than proportionate in the case of ordinary class. High price elasticity in long-run and short-run impulse responses indicate that passenger fare hike could lead to substantial decline in travel demand leading to decline in revenue earnings of the railways.

Brief reviews of the studies undertaken in this subject in Foreign-countries are given below.

Zhang Ning (1996)\textsuperscript{27} in his article titled, “Railway Service Close to People’s Lives” has 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. This undoubtedly increases the competitiveness of rail to roads.

Jonathan Cowie and Geoff Reddington [1996]\textsuperscript{28} attempted to measure the efficiency of European railways. 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]\textsuperscript{29} analyzed cost-benefit analysis of the high-speed train (HST) in Spain. In this study, an ex-post cost-benefit analysis was carries 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. The study revealed that, in order to estimate the demand increase, it has been assumed the

\textsuperscript{27} Zhang Ning - “Railway Service Close to People’s Lives”, Japan Railway and Transport Review, April 1996.
\textsuperscript{29} Glines de Rus, Vicente Inglada –“Cost – benefit analysis of the high speed train in Spain” – The annals of Regional Sciences, Vol 31, January 1997, pp 175 – 188.
GDP grows at a 2.5 per year during the lifetime of the project. Estimated benefits have been tested with a sensitivity analysis extending the life span of the GDP growth rate to 3%, using shadow prices for labour and increasing generalized costs of train, car and bus in a 25% to allow for differences in quality. The study also revealed that the introduction of HST in Spain was not justified in economics terms in 1987 in the chosen corridor.

Luisa Affuso, Jullien Masson and David Newbery [2000]30 conducted a study on “Comparing investments on new transport infrastructure Roads Vs. Railways?. This paper contributes to the debate on investment in transport infrastructure and the allocation of public funds for road and railway projects. By using consistent social cost-benefit methodology to appraise investment in typical new inter-urban road and rail projects. From the research they 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]31 analyzed in their study about a sub additivity test for the cost function of the principal European railways. 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 subadditive. 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. Besides, these efficiency gains are greater when the two new companies specialize their production either; on passenger or on freight traffic. 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. The results seem to confirm that the current trend in the European rail policy based on the separation of the different rail services must be favoured.

Jon Shaw [2001]32 made a study on competition in the UK passenger railway industry. 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 interavailibility’ (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 completion 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)\textsuperscript{33} in his article, “Passenger Service Technologies” 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]\(^{34}\) analyzed in their study about a decision support system for crew planning in passenger transportation using a flexible branch-and-price algorithm. 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]\(^{35}\) analyzed in his study about restructuring the Lebanese Railway and Public Transport Authority (RPTA) from losing operator to effective regulator. The purpose of the study was to develop options for the restructuring of the RPTA including the corporations of its bus operations. The study revealed that the restructuring of the RPTA to became 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.

\(^{34}\) Richard Freling, Ramon M Lentink and Albert P.M. Wagelmans – “A Decision support system for crew planning in passenger transportation using a flexible branch and price algorithm” – October 2001.

\(^{35}\) Hadi Baaj – “Restructuring the Lebanese Railway and Public Transport Authority (RPTA) from losing operator to effective regulator” – Transport Review, Vol.22, No.1, 2002, pp 103-113
Russ Hauwood [2002] undertook a study about evaluation of the policies in British local transport plans with regard to the promotion of rail freight. 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’. Little evidence of effective action so far with regard to local highway networks. ‘Propose a national policy framework for major freight interchanges’. Although there is support for freight interchanges in a number of LTP, overall these do not amount to the implications of a national policy. ‘Promote greater use of the rail network for freight through incentives such as increased availability of grabts’. 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] made a study on reliability and heterogeneity of railway services in

36 Russ Hauwood –“Evaluation of the policies in British Local Transport Plans with regard to the promotion of rail freight” –Transport Reviews, vol.23, No.4, 2002, pp 387-412

37 Michiel J.C.M.Vromans, Rommert Dekkar and Jeo G. Kroon – “Reliability and Heterogeneity of Railway Services”, ERIM report series research in Management,2003, pp 1-23
Netherlands. 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. In this study, the Sum of Shortest Headway Reciprocals (SSHR) and Sum of Arrival Headway Reciprocals (SAHR) were described. These measures are used for evaluating the heterogeneity of the time table and for predication of the reliability. The study revealed that the heterogeneity resulting from the line plan and the time table has a negative influence on the punctuality and the reliability of a railway system. In other words, when the SSHR and SAHR show large decreases, then there are usually also large decreases in delay propagation. Therefore, a relatively simple rule of thumb for timetable design is to minimize the SSHR and SAHR. This may improve the reliability of the offered services.

Kiyohoto Utsunomiya [2004] analyzed about CPI quality adjustments and productivity growth. 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 Beko [2004]\(^{39}\) undertook a study about some evidence on elasticity of demand for services of public railway passenger transportation in Slovenia. 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 re-organization 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. The authors usually include five groups of explanatory variables, which can be divided into two classes. The first class comprises of the variables with which we

are trying to capture socio-economic factors. It is possible to
distinguish among four groups of variables and price variables,
income variables, seasonal factors and other socio-economic factors.
In the second class we place the group of variables that express
qualitative components of the demand factors like frequency of
arrivals and departures, saved travelling time in comparison, with
alternative mode of travel and quality of services supplementing basic
service. When analyzing passenger railway transportation, it is
reasonable to expect seasonal influences. Simple graphical analysis of
time dynamics of the number of transported passengers showed that
the number substantially declines in the summer months of June,
July, and August or in the second and third quarters. This study
revealed that taking into account the estimates of demand functions
for services of railway passenger transportation in Slovenia. In the
case of increased average rail fares the number of passengers
transported by rail decreases percentage terms by less than the fare
increases in percentage terms. This findings suggested that increasing
fares are likely to allow lower transportation subsidy and consequently
also a reduction in financial supports from the state-budget to the
railway sector.

Bard Cole and Christine Cooper [2005] analyzed about making
the trains run on time. The purpose of the study was to analyze the
uses of performance indicators in the newly privatized British rail

40 Bard Cole and Christine Cooper –“ making the trains run on time: the tyranny of
Performance indicators” – production, Planning and Control, vol-16, No.2, March
2005, pp 199-207
industry and to consider whether the information that these indicators transmit to the public gives a realistic impression of the quality of service provided to rail users. 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]41 in their study analyze the railway capacity determination model and rail access charging methodologies. The purpose of the study was concerned with the determination of capacity levels of railway lines. 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. The acceleration and deceleration protocols of trains entering or leaving a section also influence the SRT. If the maximum allowable velocity of the next section is higher than the limit of the current section then trains change speed after entering the new section; otherwise, trains change speed prior to entering a new section.

Dennis Huisman, Leo Kroon, Ramon Lentink and Michiel Vromans [2005]\textsuperscript{42} studied about the operations research in passenger railway transportation in Netherlands Railways. 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 Dannis Huisman [2005]\textsuperscript{43} analyzed in their study about shunting of passenger


train units in railway station in Netherlands. 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 goal of night-time shunting is to park the units in such a way that the railways operations in the morning can start up as smoothly as possible, while certain restrictions with parking, routing, cleaning, short-term maintenance and crew planning is met. In the Netherlands, most train units can move by themselves in two directions and do not need locomotives. 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] made a study on using choice experiments to assess people’s preferences for railway transports of hazardous materials. This study investigated whether the choice experiment (CE) approach can be used to assess people’s preferences and the determinants of these preferences in order to estimate the costs and benefits of different configurations of the transport of hazardous materials by rail. The transport of hazardous materials is

an economic activity of concern to society. In decisions concerning transports there is an interest in the value of a marginal change in the risk of an accident, and this value may be obtained by studying individuals’ preference towards changes in accident risk. The main purpose of this study was to investigate the potential of CE for modelling 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 out-comes, 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] made a study about the Intermodel and Intramodel Competition in Passenger Rail Transport.

---

on the link cologne Berlin in Germany. The objective of this study was to analyze inter and intramodel 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 increase in airlines costs induces an increase in their prices by nearly 10%. Expecting these higher prices the railway company anticipates a gain in traffic and increases its fares by a small amount to make more profit. The study also revealed that the effectiveness of competition on a particular market of transport services, need to account for all potential travellers, all modes and all firms and a small number of competitors is enough to create a high degree of competition.

Moshe Givoni [2006] analyzed the development and impact of the modern high speed train. The purpose of the study was to analyze

---

46 Moshe Givoni –“ development and impact of the modern high speed train” – Risk Analysis, vol.26, No.5, 2006, pp593-611
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.

Akiko Sakanishi [2006] attempted a study on commuting patterns in the Osaka Metropolitan area of commuter rail passengers. The purpose of the study was to analyze the factors responsible for the decline in demand for rail service by analyzing the changes in population and analyzing the spatial distribution of rail commuters, to analyze the change in the number of commuters with respect to travel time to the Central Business Districts (CBD) and to analyze the cause of this sharp decline linked with the urban spatial structure and also

---

to analyze the implications of the transportation policy and land-use planning the metropolitan area geared towards predicted future population shrinkage. Geographical Information System (GIS) has been widely used for urban transportation planning. GIS provides transportation planners, policy makers and researchers with new platforms for analysis and visualization. The decline in the number of rail commuters can be primarily attributed to the decreasing proportion of rail use for commuting due to the decentralization of jobs and partially attributed to the low employment growth rate during the period of the economic slump, and to net out-migration. Modes of transport are categorised as walking, use of rail, bus, private car, motor cycle, and bicycle. Commuting time to the CBDs is calculated as travel time by rail from a station in the suburbs to the terminal stations in the CBDs. Commuting time includes the transform time and is computed for morning commuter. The study revealed that the estimation of age-specific net migration indicates that net out-migration took place in the ranges below a commuting time of 30 minutes, which partially accounts for a decline in the number of commuters. The analysis indicates that, overall, low fertility rates scarcely had any negative effects on the working age population between 1990 and 2000.

Karst Geirs, Rinus Haaijer and Bert Van Wee [2006] analyzed in their study the option value of public transport methodology and

48 Karst Geirs, Rinus Haaijer and Bert Van Wee-“Opinion Value Of Public Transport” Meth for measurement and case study for Regional Rail links in Netherlands” – Transport Reviews, vol.26, No.5, Sep-2006, pp 613-643
measurement for regional rail links in the Netherlands. 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 most train users were infrequent travellers about 70% used the train less than once per month only 7% were frequent users, with a frequency of four to five times per week, about 25% of the train users in the past year. The frequency of option use was relatively low; about 45% used the train once or twice per year as option user 30% three to five times; 10% six to ten times, and 15% more than 11 times. Furthermore, more than 75% of car users in the sample are “Possible option users’, they consider using the rail services in unexpected situations when their car is not available. The study also 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] 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. Computational results are presented for the real-life cases of NS reizigers, the main Dutch passenger railway operator is typically operating the timetable or it is in maintenance. However, outside the rush hours and operator usually has a surplus of rolling stock. In order to able to fully exploit the main railway infrastructure, the idle rolling stock is parked at a shunt yard. Since only a few passenger night services exist in the Netherlands, most rolling stock has to be parked during the night. The study provides a model for solving this shunting problem for general shunt track configuration, where train may consists of several units. The study revealed that the model is able to produce high quality solutions usually with in reasonable amounts of computation time.

Rainald Borck and Matthias Wrede [2007] in their study analyzed the commuting subsidies with two transport modes. The purpose of the study was to analyze the redistributive effect of commuting subsidies in a monocentric city with two income groups and two transport modes. City residents choose where to live and to

---


use which transport mode. The study revealed that with resident landownership, subsidies always redistribute between city resident and therefore one group gains and other losses. With absentee landownership city residents as a group generally benefit from commuting subsidies at the expenses of landowners. When the poor live in the city center and use public transport while the rich live in the suburbs and use cars and subsidies to public transport benefit the poor, while the rich may benefit from the subsidies to cars. The study also revealed that with the three distinct areas, where the rich use public transport in the centre and cars in the suburbs, while the poor live between those groups and use public transport.

Jamie Dallen [2007]51 made an attempt in his study about sustainable transport, market segmentation and tourism in the Looe Valley branch line railway, Cornwall, UK. The objectives of the research were to increase passenger volume, freight usage and income to manage down the units of running the lines, and to involve the local community more closely in the development of its railway. The study discussed the implications of this survey finding for attracting more people to use the looe valley line. This study applies cluster analysis to LVL users in order to develop a greater understanding of travel attitudes. This will enable a more in-depth knowledge of the types of travelers using the line, as well as allowing a greater understanding of how service improvements could be targeted to

develop particular market segment. The analysis should also contribute to the development of more customer focused marketing strategies that can potentially be used to increase usage of the branch line. This research finding highlighted the complex mix of attitudes and desires of users across LVL users profile and although the findings are only representative of a one-week profile of train users during July, they serve to highlight the complexity of attitudes amongst users. They show the differences between types of tourist and recreational users in terms of attitudes, perception and visitor activities, and that user profiles are clearly more complex than a dichotomous division of local and tourist users. The findings also appear to complement previous a posterior market segmentation research findings by Anable of travel by national trust leisure visitors. This research provided a first stage towards building a more detailed understanding of branch line railway passenger markets. This study also considered the diverse market segments with in a sample of current users and commented on how segments might be more effectively targeted through particular marketing and management decisions.

Patrick Dawson and Ian Mcloughlin\textsuperscript{52} undertook a study about the effects of computerization on railway freight supervisors. The objectives of the study were to examine critically general view that the overall tendency with the application of computer technology is to

erode the importance of supervision in relation to management control and to examine the implications for supervision of British rails which attempt to computerize the control of its freight operations. The study revealed that computerization did enhance the ability of yard supervisors and a charge man to preplan and control yard stocks was more readily available. The study also revealed that computerization enabled British Rail management to develop a strategy for redefining supervision in a manner which both increased headquarters’ control of freight operation and enhanced the role played by local supervisors. The availability of up-to-date accurate information about local operations enables a centralization of overall control at regional and national headquarters. However it was also possible to delegate responsibility for day-to-day decisions to local areas from divisional level. The role of the area freight assistants was designed explicitly to exploit the control potentials of the new information that was made available by the computer.

Jaspe Dekkers and Piet Rietveld [2007]53, in their study evaluate the “Electronic Ticketing in Public Transport in Netherlands”. 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. The users found the M-ticket services very convenient and easy to use; no more queuing and waiting of the participants, 68% stated they should stop using the M-ticket service if it cost 25 eurocents per call. The share using the internet as a means to order electronic tickets was about 30%. Thus, the overall WTP (Willingness Top Pay) of customers for M-ticket services must be considered as low. An ordinary least squares-regression analysis of the WTP for real-time travel information revealed that it increases with income and with the frequency of mobile phone use. The WTP also depends on travel behaviour and the complexity of the journey.

In a nutshell this chapter narrates the twenty six studies undertaken in Indian context and twenty seven 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 amenities provided by Indian Railways. This research gap has been identified by the researcher and undertook a detailed study on this vital theme.