CONCERNING THE BEHAVIOR OF PASSENGERS WHEN CHOOSING A SEAT IN A COMPARTMENT PASSENGER RAILWAY CAR

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ОТНОСНО ПОВЕДЕНИЕТО НА ПЪТНИЦИТЕ ПРИ ИЗБОР НА МЯСТО В КУПЕЕН ПЪТНИЧЕСКИ ВАГОН

Abstract

This report presents the results of an empirical study of the behaviour of passengers when choosing a seat in a second class compartment passenger railway car. The most and least used seats are identified.

Keywords: Seating Behavior; Occupancy; Compartment Passenger Railway Car.

Introduction

A number of studies [1], [2], [3], [4], [5], [6], [7], [8] have been conducted globally on passenger seating behaviour, occupancy dynamics and occupancy of various vehicles. Research is both psychologically oriented and aimed at creating mathematical models. The research object is mainly an aircraft, metro trains, suburban trains or high-speed trains. These vehicles are open (saloon) type and are used only in short or long distance. Mathematical models have been created that have great adequacy. In the Republic of Bulgaria, a large number of the passenger railway cars are compartment type. This type of railway car is used in long-haul trains that are used by both long-distance and short-distance commuters. The objectives of the present study are twofold: to analyze passenger seating behavior and to identify the most frequently and least frequently used seats in a second class compartment passenger railway car. As a subsequent stage, the fire characteristics of these seats will be compared after a certain operational period.

MAIN RESULTS

As the first stage of the research, the passengers' seating preferences were studied through a survey. A survey was conducted among travelers from the Central Railway Station in the city of Sofia in the period May-August 2022 and through the Google Survey platform. The full survey results are presented in [9]. The main factors that most often determine the passengers' seating choice have been identified. These are: direction of movement of the train, location of the seat relative to the window/door/WC, pre-occupancy of the compartment, profile of the other passengers in the compartment, serviceability of the interior, position of the sun and others. These factors can be classified into two groups: permanent and relative. The direction of movement and the location of the place in relation to certain elements of the interior are constant preferences of the individual. The remaining factors are relative and depend on the current situation.

Respondents were presented with a diagram of a second class compartment passenger railway car, (Figure 1) and asked to indicate the compartment and seat they would choose for their journey. The hypothesis is that all seats are free and the respondent is traveling alone.

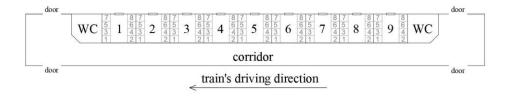


Fig. 1. Distribution of compartments and seats in a second class passenger railway car

According to the answers of the respondents, compartment No. 2 is the most preferred, and compartment No. 8 is the least preferred. The results regarding the passangers' seating preferences in the compartment are eloquent – the most preferred seat is No. 8, followed by seat No. 7, and the least preferred seats are No. 5 and No. 6. It can be concluded that the most preferred seats by travellers, regardless of the compartment, are next to the window, and the least percentage of passengers prefer to travel in middle seats. Seats facing the train's driving direction are preferred.

Reservation of a seat is mandatory when buying a ticket only on some of the passenger trains in the Republic of Bulgaria. For other trains this is optional and the passenger can choose whether to reserve a seat in advance or choose a seat after boarding the train.

In case of pre-selection of a place, the traveler can comply with only a part of his preferences. The ticketing system of Bulgarian State Railways gives a diagram of the car, but not the train's driving direction. The cars are symmetrical and they can be attached in a train bilaterally. Passengers cannot determine the driving direction and in reality compartment No. 9 may be first and compartment No. 8 second in train's driving direction. In the pre-selection of a seat, only two factors have an influence: the location of the seat in relation to certain elements of the interior and the momentary occupancy of the compartments during the selection. In the period |November - December 2023, the preliminary seat reservations for several trains on the Sofia – Gorna Oryahovitsa - Varna line were analyzed. The conclusion of the conducted survey is confirmed that the most preferred seats by an independent traveler are those by the window and they are booked the fastest. The conclusion made in [5] that if the one seat next to the window is occupied, the choice diagonally wins cannot be unequivocally confirmed. In 58% of cases, the other seat next to the window is chosen, and the diagonal seat in 31% of cases. If the seat selection is in the same row, travelers choose to keep their personal space and leave an empty seat between them and the already reserved seat.

When traveling in a group and booking more than one seat, the results show that if there are two travelers in 46% of the cases the two seats next to the window are chosen, in 24% of the cases the one seat next to the window and the one next to it are chosen, in 20% of the cases the two seats by the door. If there are three passengers, in 86% of cases the two seats next to the window and the one next to it are chosen. Cases of a larger group of travelers have not been analyzed. If the seats by the window are occupied, the seats by the door are chosen, leaving a free seat for the other passengers.

Regarding the choice of compartment, the analysis shows that the most reserved seats are in compartments No. 1, 2 and 9. The least reserved seats are usually in compartment No. 6.

It is observed that the occupancy of the carriage is uneven and depends on the time of departure, the day of the week, the presence of a public holiday. The final destination of the

analyzed trains is a maritime tourist center, which suggests a different occupancy during this season, which is not included in the analyzed period.

In the analysis of pre-bookings, the author also has no data on the profile of the travelers, the travel distance and the amount of luggage they will travel with. Also, some of these trains are without mandatory advance seat reservation and some of the passengers choose their seat at the time of boarding. This necessitated the conduct of an on-site research. In December 2023, passengers were observed on the trains with analyzed pre-reserved seats. On the diagrams of the car, the occupancy of the seats at each stop of the train was noted. Gender, apparent age, amount of luggage and distance traveled were recorded.

The results show that 37% of travelers prefer to reserve a seat in advance, the remaining 73% choose where to sit when boarding the train. Those choosing to book seats in advance fall into at least one of the following categories: traveling longer distances (over 100 km), visible age over 30 years, accompanied by a child, traveling with bulky luggage. The analysis shows that those traveling over 100 km with advance booking prefer seats in compartments No. 2, 3 or 5.

The wagons analyzed have a total of four doors at both ends. When boarding, passengers use the two adjacent to the platform. The number of people getting on from each door is about the same. Two streams of passengers form towards the middle of the carriage (compartment No. 5). Often, passengers with a pre-booked seat board from the opposite door to their seat. This indicates that a large number of them expect coupe No. 1 to be first in the direction of traffic. Of the observed wagons, 51% were oriented so that it was first in the direction of movement.

In 72% of cases, a passenger without a pre-selected seat chooses one until reaching the middle of the carriage. In 65% of cases, passengers without a pre-reserved seat who are traveling a short distance or have larger luggage choose a free seat in the first or second compartment closest to the door from which they boarded, regardless of how full it is. Longer-distance travelers choose a seat in less crowded compartments, preferring to have an open seat between them and another passenger.

In connection with the set goal of identifying the most and least used seats, seat occupancy was monitored after each train stop on the Sofia - Gorna Oryahovitsa - Varna line. The results were filled in a form presented in Figure 2.

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Sofia	1	1	1	1		П	1	1	1 1	. 1	1	1	1	1	1	Т	1	1	1	1	1	1	1	1	1	1 1	1	1	1	1	1	1	1	1 1	1			П	1	1		1 1	1		1		T	1	1	1	1	1	1	1	1	1	1 :	1		1	1		1	1
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Varna		T					T	T	Т	Г	Г	Г	П	T	Т	Т	Т	Т	Т	Г	Г	П		Т	Т	Т	Т		П	П		Т	T	Т	Т	Т	Г	П	П	Т	Т	Т	Т			T	Τ	Τ	Т	Т	Г	Г		П		Т	T	Т	Τ	Г			П	

Fig. 2. Form for marking the occupancy of the seats in the monitored carriage

15 observations were made on the same train on different days of the week. Due to the many holidays in the month of December, train occupancy varied significantly during different periods of the month. After analyzing the data, the results indicate that the probability of seat No 8 in compartment No 2 being filled throughout the train route is the highest – P=0.72. The lowest probability that it is filled throughout the entire train route (P=0.29) is at seat No. 4 in compartment No. 6. The probabilities of each seat being occupied at the various train stops were calculated. Occupancy probabilities were also calculated for seats from first to eighth regardless of the compartment. The results show that seats No 7 and No 8 are most likely to be filled. Places No 3 and No 4 are least likely to be occupied.

CONCLUSIONS

The passenger seating behavior in a compartment passenger railway car depends on many random events. It is difficult to draw general conclusions given the possibilities of pre-booking a seat and choosing one after boarding the train.

The observational field study showed that there is a discrepancy between the initial preferences of the passengers and the real choice of seat in the car. According to the survey conducted, the least preferred seats are No 5 and No 6, and the real choice indicates that it is seat No 4. However, it is confirmed that seats No. 7 and 8 are most preferred.

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