

# Results of the Study of the Causes of Injuries of Shunting Masters

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**Keywords:** shunting masters, professional suitability, phobia, muscle strength, movement speed, agility, performance, survey, station, workplace, injury.

**Abstract:** In the conditions of train movement and shunting work, train compilers are exposed to great danger, which increases when trains move forward, as well as in the case of a mismatch of physical and mental fitness, shunting masters have a dangerous state in their work, which, due to insufficient qualities of human movement, can lead to dangerous cases, while increasing the likelihood of accidents involving occupational injuries of various kinds. This article presents the results of a survey conducted to determine and study the causes of injuries among the shunting masters of the Khamza station of the Tashkent Regional Railway Junction.

## 1 INTRODUCTION

The workplaces of shunting masters are located inside the rail track or in the immediate vicinity of it and on the rolling stock (Instructions, Republic of Uzbekistan; Rules of technical operation, Republic of Uzbekistan.). In conditions of train movement and shunting work, these persons are exposed to great danger, which increases when trains move forward with wagons (Zhukov, 2014; Evseeva, 2002; Kaptsov, 2000). It is known that the causes of injuries are conditionally divided into objective and subjective (Vilk, 2001). For example, intense noises muffle warning signals; lack of training of workers in safe working methods; discrepancy between the qualifications and health status of the worker to the work performed by him; performing complex and dangerous operations without the participation of the work manager; low labor discipline; unsatisfactory quality (or absence) of workwear, shoes and personal protective equipment; violation of work and rest regime; insufficient and irrational lighting of workplaces and station tracks; unfavorable meteorological conditions (low temperature, wind, precipitation, blizzard, etc.); noise that drowns out warning signals about danger; short-term unreasonably increased labor intensity; absence or unsatisfactory condition of welfare spaces. The

subjective reasons are: carelessness (mind-wandering, distraction, etc.), unsatisfactory quality of movement (muscle strength, speed, agility, flexibility and efficiency) of the shunting master (Zhukov, 2014; Vilk, 2001; Kaskov, 2006), the presence of various phobias (agoraphobia, acrophobia, aichmophobia, acoustic phobia, amatophobia, claustrophobia, nyctophobia, etc.), fatigue, awkwardness (Sulaimanov, 2021a; Suleymanov, 2021b; Suleymanov, 2021c). With careful analysis, usually the presence of objective reasons from the shunting master requires a quick response in the course of work to evolving, changing situations (Suleymanov, 2021c; Sulaymanov, 2021d; Sulaymanov, 2019). In the case of a discrepancy between the physical (Resolution of the Cabinet of Ministers of the Republic of Uzbekistan, 2019) and mental preparedness of the shunting master, a dangerous state occurs in work, which, due to insufficient qualities of human movement, can lead to dangerous cases, while increasing the likelihood of accidents with occupational injuries of various kinds (Kopeikin, 2011; Sulaimanov, 2021).

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## 2 MAIN PART

To determine or study the causes of injuries among shunting masters, a survey was conducted among the shunters of the Khamza station of the Tashkent Regional Railway Junction. The following questions were included in the questionnaires (Sulaymanov, 2019):

1. Have you been injured in the course of your work;
2. In what circumstances did the occupational injury occur;
3. Do you know the cause of the injury;
4. Which part or organ of your body has been injured;
5. Do you know what kind of injury you received;
6. After how many days did you return to work;
7. How and who chooses special footwear;
8. What personal protective equipment do you use;
9. How to choose gloves and their material;
10. Dimensions of stair handrail (diameter, shape, surface roughness, etc.);
11. Dimensions of the ladder tread (width, length, material, surface roughness);
12. Dimensions and indicators of brake shoe (handle diameter, weight, etc.);
13. Does the shunter need a radiotelephone;
14. What are the disadvantages of the shunter's workwear;
15. What are the suggestions for reducing occupational injuries;
16. What suggestions are there to improve the working conditions of the shunter;

Histograms are constructed based on the data obtained after their processing (Fig. 1-16).

The analysis of the obtained results shows that 18% of shunting masters with 5 or more years of experience received various injuries. Injuries to various limbs (upper and lower) mainly occurred when falling from the steps of the car (30%), while climbing the steps of the car (25%), while crossing the railway track and descending from the steps of the car (18%). The causes of injury are considered by shunting masters to be 50% to 50%. The knee joint (67%), elbow and head (33%) were mostly injured in all the surveyed shunters. The resulting injuries lead to 25% strained muscles, bone fracture of the upper and lower limbs, head injury, etc. 68% injuries of shunting masters lead to the temporary incapacitation from 7 days to 1 month and are moderate injuries. Considering that, 50% of the injury is due to slippery steps of cars. The question of who and how chooses the special footwear of the shunting master was

studied, and it was revealed that 67% of the shunters do not know how to choose shoes taking into account the sole material in order to prevent slipping when walking on the steps. 67% of shunting masters do not use personal protective equipment for individual parts of the human body (knee pads, elbow pads and hard helmets), the materials of gloves by the value of their sliding coefficient on metal handrails does not allow strong fixation of hands. According to the survey materials, the dimensions of the handrail (diameter, shape, surface roughness, etc.) are not convenient for moving up stairs, ramps and for reliable fixation of the human body on the steps of freight cars when it moves. All the shunting masters surveyed consider shoes not comfortable and heavy, as well as 20% of shunters consider radiotelephones unnecessary and interfere with work. 50% of the shunters consider glove materials slippery and, in their opinion, special clothing wears out quickly, the soles of shoes are slippery and not convenient to work with. According to the results of surveys, shunting masters propose to improve the design of stairs, steps, handles, to develop norms and requirements for the shunter's workwear. In addition, it is proposed to normalize sanitary and hygienic working conditions (Kaskov, 2006) (fig. 1-3).

## 3 CONCLUSIONS

In general, the results of studying the causes of injuries among shunting masters showed that they are injured due to a fall when descending from a moving car, due to the lack of development of movement qualities and non-compliance of the basic physical and mechanical indicators of special clothing and shoes. In addition, the causes of injuries to shunting masters may be various phobias that individuals who work as shunting masters have (Evseeva, 2002; Kaptsov, 2000; Sulaymanov, 2021d). In order to eliminate the causes of injuries among shunting masters associated with physical inconsistencies in human motor qualities (speed, strength, agility, flexibility, efficiency) (Sulaimanov, 2021) and the stability of psychology to various phobias generated by working conditions, it is necessary to develop a methodology for assessing the professional suitability of shunting masters for high-quality professional selection (Kaptsov, 2000; Kaskov, 2006). High-quality professional selection of the shunting master will significantly reduce the likelihood of accidents at work.

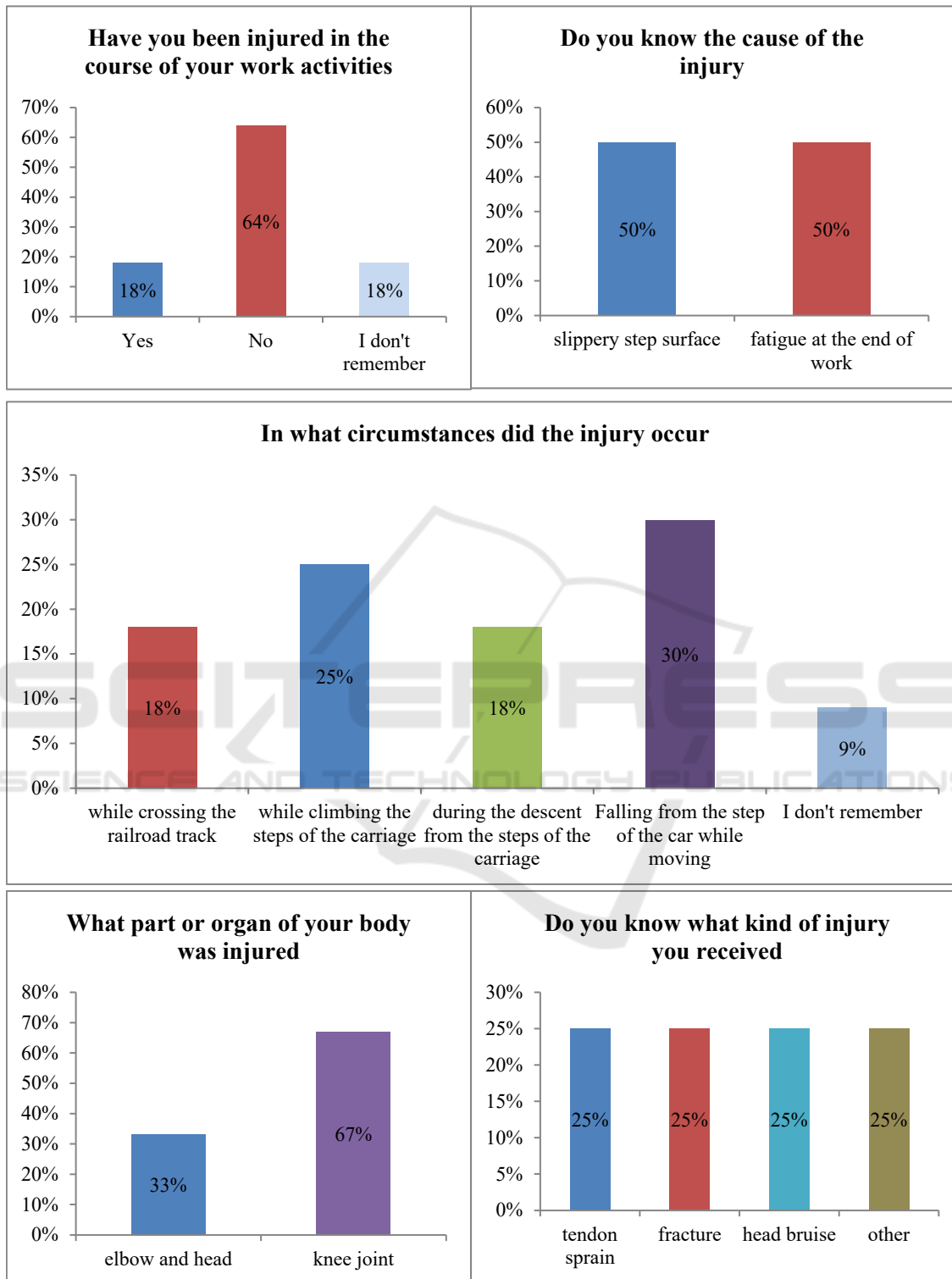


Figure 1: Questions 1-5.

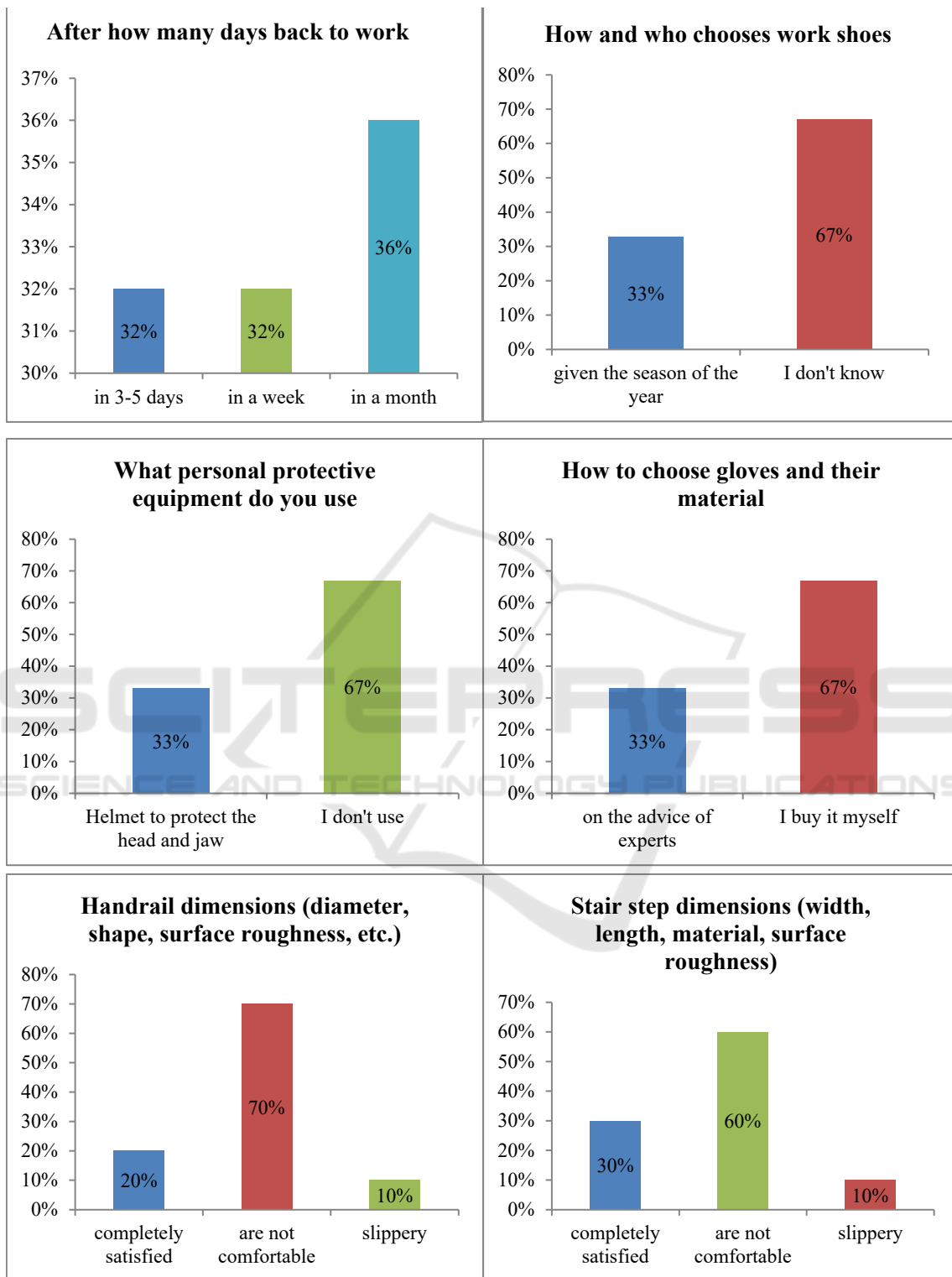


Figure 2: Questions 6-11.

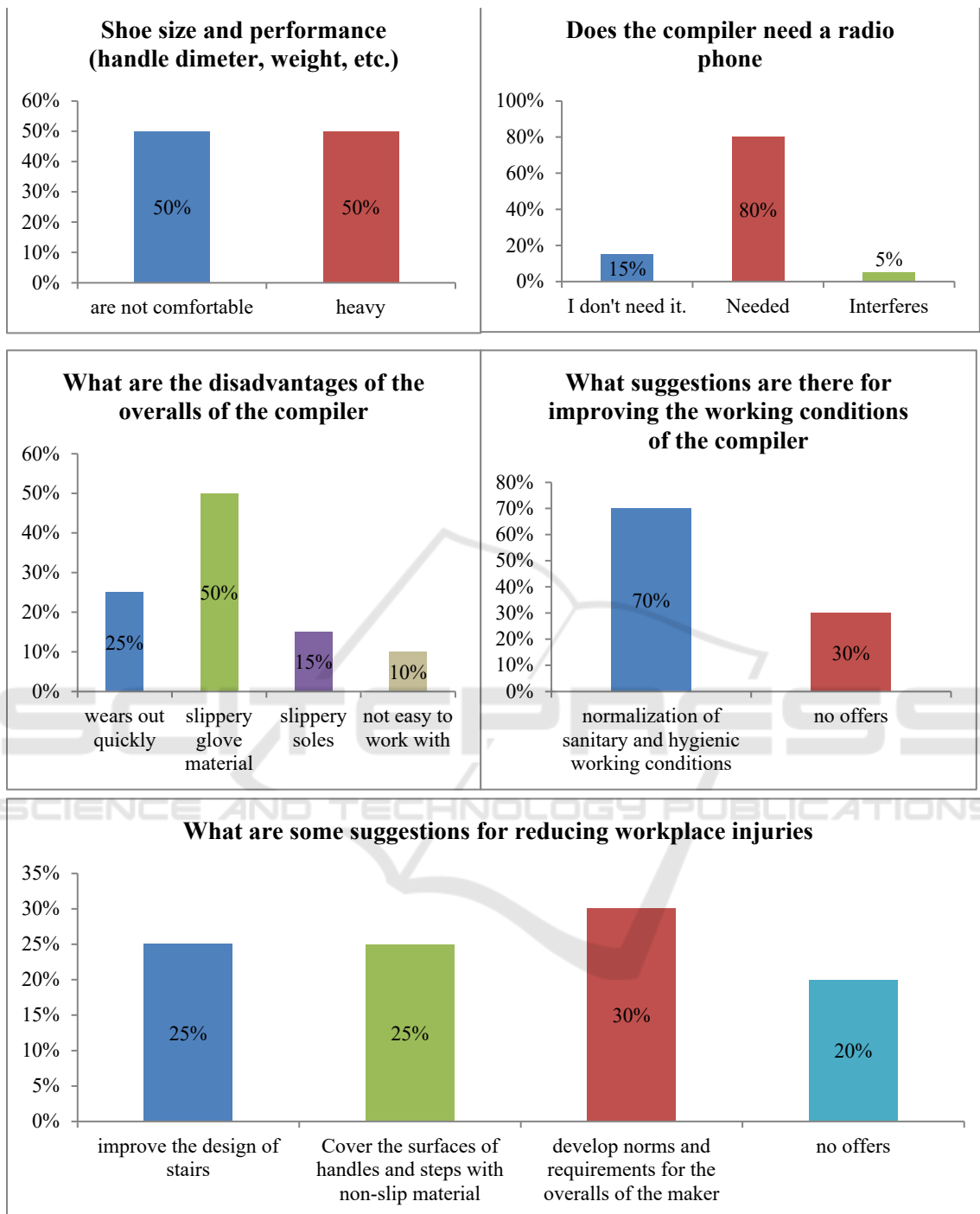


Figure 3: Questions 12-16.

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