

Social Factors Which Determine Reliability of City Bus Drivers (As Exemplified by Vladivostok-City)

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Abstract: Assessment of the quality of passenger's transport services in Vladivostok has shown that in passengers' opinion, drivers' work was the worst among other parameters of quality. Besides that more than a half of all road accidents in Vladivostok involving city passenger transport were caused by bus driver's fault. Therefore safety of passenger transportation to a great extent depends on reliability of bus drivers. This article names the factors influencing drivers' reliability - external, internal and social. The author considers social factors in detail - such as age, length of service, marriage status, ways of life and bad habits. These parameters were used for evaluation of drivers of one of the biggest motor transport enterprise of Vladivostok.

Key words: Bus • Passenger transportation • Safety • Reliability of a driver • Social factors • An ideal bus driver

INTRODUCTION

In Vladivostok the share of automobile transport amounts to 90% of city passenger transportation, bus fleet of the city consists of about 1000 units [1]. Recently public transport of Vladivostok started to change following changes of the whole city infrastructure. However the surveys demonstrate that the level of transport services is not satisfactory from city inhabitants' point of view.

In 2013 students and teachers of the chair of Transport vehicles and transport-technological processes of Far Eastern Federal University (FEFU) made a survey to assess the quality of passenger transportation in the city of Vladivostok. The respondents were students and employees of FEFU who were proposed to evaluate the quality of service by 10-points scale. The results of the survey showed that the population of the city, in general, assess the passenger transportation quality as not very high - 6 points of 10. In the same time the lowest points were given to drivers' work (3,5 from 10) [2].

Safety is one of the most important parameters of the quality of passenger transportation. [3,4]. Quantitative estimate of safety is accident rate. In 2012 in Vladivostok there were 25 road accidents involving city buses in which 2 people died and 33 were injured (Figure 1).

As we see from the figure, more than 60% of accidents involving city passenger transport occurred due to a fault of a bus driver. It shows that safety of passenger transportation and road traffic in general as well as quality of transport services depends to a great extent on the reliability of bus drivers.

Main Part

Factors, Influencing Reliability of a Driver: Reliability of a driver is his ability to drive a vehicle for a period of time without mistakes. Factors which influence the reliability of a driver can be divided into external, internal and social. (Figure 2) [5].

Factors influencing reliability of driver's work

- Complexity of a route (length, the state of road surface, engineering installations (road signs, road marking) number of lanes, road traffic rate);
- Pollutant concentration;
- Accident rate

Internal Factors: Driver's seat

- Ergonomics;
- Harmful substances;
- Noise;

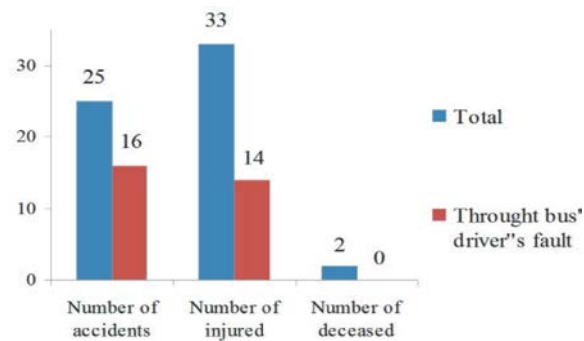


Fig. 1: Passenger's transport accident rate (Vladivostok, 2012)

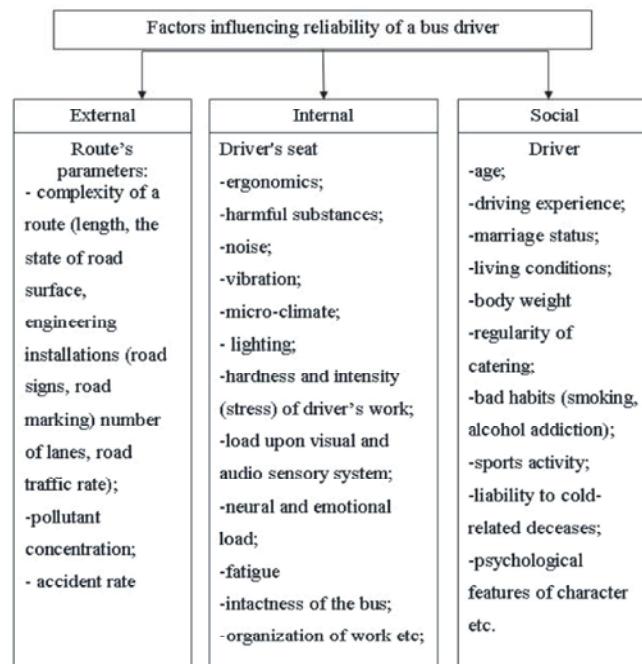


Fig. 2: Factors which influence reliability of a bus driver

- Vibration;
- Micro-climate;
- Lighting;
- Hardness and intensity (stress) of driver's work;
- Load upon visual and audio sensory system;
- Neural and emotional load;
- Fatigue
- Intactness of the bus;
- Organization of work etc;

Social: Driver

- Age.
- Driving experience;
- Marriage status;
- Living conditions;

- Body weight
- Regularity of catering;
- Bad habits (smoking, alcohol addiction);
- Sports activity;
- Liability to cold-related deceases;
- Psychological features of character etc.

External factors are determined by the characteristics of the route - its complexity, concentration of pollutants, accidents rate on the road, which in its turn depends on the intensiveness of road traffic on the sections of the route and on the number of accidents clusters.

It is not possible to influence external factors in the current situation of constant growth of motorization. But you can limit the time of driver's exposure to them by following regime of work and rest.

Internal factors are the parameters of working place of a driver (microclimate of a cabin, noise, vibration, lighting, availability of harmful substances in the air of the driver's cabin, ergonomics). Their deviation from the norm results in quick physical fatigue, reduction of mental activity, slow-down of reaction and as a result – in safety reduction.

Work of a driver is very hard. [6]. Recently the situation has been aggravated by increase in road traffic and passengers complaints. [7] During his work a driver gets a lot of information by means of his vision and hearing, therefore the load on visual and hearing sensors is huge. When ability to see or hear is reduced the reliability of a driver reduces too.

In order to reduce influence of internal factors the work of a driver must be organized in a proper way (in particular, following regime of work and rest) and comfort conditions at work must be created, namely: ergonomics of driver's working place and its microclimate should be improved, the level of vibration and noise must be reduced. This can be achieved by operating modern buses which correspond to all requirements of active and passive safety. It must be mentioned that within last 3 years the bus fleet of Vladivostok has been actively renewed.

Social factors are determined by psychological, physical and personal characteristics of a driver

Social Factors Influencing Driver's Reliability: So, social factors are as follows: age, driving experience, health condition, the level of preparedness, psychological personal features etc. (Figure 2). Let us analyze them in detail.

Probability of road accident occurrence and driver's reliability to a great extent depend on his age. The most dangerous age is between 18 and 25 years. This is explained by little experience in driving and overestimation of one's own professional abilities. Besides that the age over 50 is also not good - drivers of this age demonstrate significant reduction in reliability; most of these drivers have solid track record in driving but they manifest worsening of a number of functions, which are important in terms of safety control, for example, acuity of vision (quick sightedness), especially during twilight period, or when a driver is blinded with the light of an oncoming vehicle.

In order to obtain necessary skills in forecasting of accident situation a driver must drive a vehicle for about 100 000 km. This length corresponds to 5-10 years of driving [8].

Marriage status influence psychological state. As a rule stable marriage status makes a man calm, balanced, he has less reasons for worries and all this results in increase of his ability to work and his reliability. Besides that the number of marriages matters. If there were more than 3 it means that a man is not able to get on with people well, changeable or has some bad habits.

Living conditions also affect reliability of a driver. For accidents-free operation a driver needs a good rest - and it is not possible in unfavorable living conditions.

Deceases are directly connected with body's weight. If a driver is fat he will suffer difficult breathing, heart hurry, different CVDs, diabetes etc. All this can result in abrupt decrease of driver's health, even lead to fainting, which in turn can provoke accident situation.

As for drugs (medical means) their use can also influence the state and reliability of a driver. Especially dangerous are drugs which contain sleeping, sedative or reducing arterial blood pressure substances. Such drugs result in day-sleeping, reduce ability and readiness to act after sudden changes of situation on the road, increase the time of reactions. Heat-reducing (antipyretic) and pain-killing drugs which drivers often take after catching a cold or when he feels a headache produce weakness, reduce the acuity of vision and hearing [9].

Regularity of catering affects driver's health and mood - it also influences reliability.

When going in for sports the human reaction's speed increases, motor and physical characteristics improve - it influences a driver's reliability in the best way.

Firstly, smoking distracts driver's attention and can lead to an accident. Secondly, cigarette smoke produce widening of brain's blood capillaries, in the result of which a man feels rush of energy, but then capillaries become narrow again and the ability to work decrease even more. Thirdly, constant smoking produces invisible thin coating on the inner surface of cabin's window-glass which reduces its transparency and as a result the visual ability.

Influenced by alcohol a man loses ability to control his actions and behaviour, to evaluate situation in a proper way. Working ability reduces, psychological and physiological abilities also reduce, but a man feels that he is able to do any kind of work which in reality he can not perform [9].

Personal features, in particular, the type of temperament of a driver, are not of the least importance. Sanguine type is the most suitable for driving. Sanguine person with strong and even-tempered neuro-system is a best driver especially in the city. Phlegmatic having

strong balanced but inertial neuro-system after some practice is able to forecast road situation well which enables him to drive rather safely. Choleric driver hurries and does some things before their proper time but he must control his behaviour and as a result can provide good reliability. Melancholic with his weak neuro-system and unbalanced nervous processes can drive in a rather reliable way but when road traffic is intensive and demands quick reaction his reliability abruptly decreases. That is why melancholic is the least suitable person for driving.

And of course reliability strongly depends on personal features of a driver: responsibility, attitude to his profession, adventurism, thoughtlessness, risk appetite. For example some people share opinion that a driver who often changes place of work has a higher accident rate [10].

Characteristics of Drivers: Having analyzed socio-characteristics which influence driver's reliability we made a portrait of ideal driver.

So, ideal driver is a married man of age 35-45, with driving experience of 10-25 years, sanguine type with high emotional stability, reaction, with good attention, good living conditions, going in for sports, without bad habits (non-smoker and not alcohol-addict), not fat, not suffering chronic illnesses, accurate in driving, responsible person. Ideal driver exactly follows all the road traffic regulations, drives accurately and obey laws. Such driver has no penalties or complaints. He loves his profession, respects his chiefs but in the same time plays it cool. He is not narrow-minded, has hobbies and avocations.

In order to define how close Vladivostok passenger drivers are to this 'ideal' description we assessed drivers of the biggest motor-transport enterprise of the city (120 bus-drivers). Assessment was done by means of study of personal folders of drivers, namely, such parameters as sex, age, etc.

Our investigations gave the following results: all drivers of the enterprise are men, 90% of them are married, 70% have own house or a flat. The most part of the drivers are at age 25-35, average age is 31. Most part of the drivers have been working for 5-15 years, average driving experience is 11 years. No one has serious health problems. When they began to work at the enterprise and then every 3 years they pass medical survey. Only 5% from all drivers go in for sports. More than 90% smoke, 10% consume alcoholic drinks. It must be mentioned that consumption of alcohol takes place only in free time. Every day all drivers pass pre-trip and post-trip medical surveys, that is why consumption of alcohol or availability of sequences of consuming it at work are excluded.

The results of investigation of personal folders of drivers allowed us to make a portrait of average statistical driver and compare this portrait with ideal driver (Figure 3)

We see that drivers who work in one of the biggest passenger motor-transport enterprise of the city do not correspond in full to the portrait of ideal driver, which in its turn, reduces quality of passenger transportation.

Inference: The inference from all said above is as follows: high-level social characteristics of city bus drivers can be provided by means of professional selection when the drivers are accepted for employment. At first stage the applicants must be chosen depending on such characteristics as number of years of work, age, marriage status, absence of bad habits and serious penalties for breaking traffic code. Those who pass the first stage must pass psychological tests for detecting such qualities as attention, reaction, state of neuro-system, type of temperament.

Besides that increase in professional reliability can be reached by organization of work of drivers at motor-transport enterprises (following regime of work and rest,

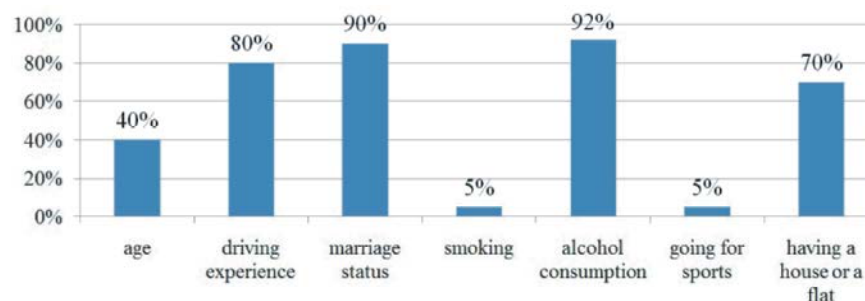


Fig. 3: Correspondence of parameters of average statistical driver to ideal driver.

performing instructions, probations, medical surveys) and using means of stimulation and motivation (both tangible and intangible).

CONCLUSION

So, reliability of bus-driver is influenced by external, internal and social factors. In order to provide high reliability of drivers the influence of these factors must be reduced. Motor-transport enterprises which use buses can not reduce external factors - complexity of a route, pollutant concentration rate and accident rate, but they partially can influence internal factors connected with transport vehicle and conditions of work. However they have opportunity to reduce influence of social factors and provide social and professional reliability of drivers.

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