2014

Psychometric Assessment of Commercial and Non-Commercial Drivers

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8/25/2014

1. PREAMBLE

Today, road crashes are one of the leading causes for deaths, disabilities and hospitalization, with severe socioeconomic costs across the world. Road safety is a major issue of national concern. During the last two decades, developing economies like India is experiencing rapid increase in human population and vehicles coupled with increase in road accidents. In the year 2012, approximately 5 lakh road crashes are recorded in India, which had resulted in 1.45 lakh road deaths coupled with the occurrence of more than 5.2 lakh Road Traffic Injuries (RTI). According to the reported statistics of causalities on Indian roads, one road crash is reported every 4 minutes which excludes the unreported road crashes expected to take place at every minute and moreover incidence called as near mistakes take place at every second. The most shocking aspect is that despite India accounting for only about 1 % of the global vehicle population, the total road fatalities on the Indian road network accounted for 10% of the global fatalities. As per the Annual Report by Ministry of Transport & Highways, 2012 (MoRT&H), the loss to the Indian economy due to road fatalities and the severe Road Traffic Injuries / Trauma is estimated to be above 3% of the Gross Domestic Product (GDP).

Need for the Assessment

Inappropriate driving behaviour is considered to be one of the major causes of road crashes in India as compared to defective geometric design of pavement or mechanical defects in the vehicles. About 65 % of road crashes on Indian roads are caused due to the fault of the road users apart from the other factors such as faulty road design, poor road maintenance and vehicle conditions account for the remaining share of road fatalities. Therefore, as a starting point, it was felt prudent to assess the psychophysical abilities of the goods vehicle drivers considering the fact that this category of drivers in the country are not fully literate coupled with the extended time span spent by them on the wheels. It is expected that the improved driver screening facilities accompanied by availability of good driving aids. This pilot project is IDAC-The Training and Assessment Institute, Delhi, India to highlight the psycho physical traits of drivers. This study addresses the assessment of visual functional capabilities of the goods vehicle drivers. It is expected that the results would be of immense use in taking appropriate measures to enhance vision requirements of the subjects and thus directly help in the enhancement of overall road safety.

2. STUDIES CONDUCTED IN INDIA

As per the reported literature, safety consciousness can be imparted amongst the drivers through the assessment of their abilities through an exhaustive driver screening programs.

Since the driving task involves performing a number of multi-tasking activities which include driving the vehicle within the road, detecting motorized and non motorized vehicles, pedestrians, judging their speed, position, their possible behaviour and reacting accordingly, Collins, et al (1999) studied several factors that can affect the visibility and conspicuous of the road signs.

Based on a study conducted in Hyderabad in India, the following deficiencies were observed:

- About 11% of motorized two wheeler drivers drive the vehicle without possessing driving license. This tendency was higher in the case of drivers aged between 16 and 25 years.

- Also, 0.5% was found to get a driver license before 15 years of age. Out of all license holders who were surveyed in the study, 21.4% had obtained the license without taking the mandatory driving test.

- Thirty per cent of the drivers were found to overtake other vehicles from any side depending on traffic conditions.

- Over 50% were found to drive the vehicle in the direction opposite to the flow of traffic.

- Out of all the drivers who were caught by the traffic police, 56% paid the fine while 26% paid bribe to escape.

- Regarding vehicle conditions, it was observed 49% of drivers had no rear view mirror in their vehicles.

Thus the above reviewed literature highlights that most of the problems are due to attitude of the drivers and most of the attitudinal problems of the drivers can be checked through the implementation of the mandatory assessment of the psycho physical traits and imparting training to the drivers in the country as it is expected to have a direct bearing on the reduction of the erratic behaviour of the drivers and road crash proneness. The purpose of this study is not to provide a set of uniform rules that can be implemented unchanged in any jurisdiction. Rather, it is aimed at providing a set of considerations for contemplating the development or refinement of rules in vogue for driving licensing.

3. OBJECTIVE AND SCOPE OF THE STUDY

The objective of this study is to assess the psycho physical traits of the drivers. This study can be considered as a useful tool for objective assessment of the driving performance and safety skills through the assessment of psycho-physical traits of the subjects considered in this study.

The tests conducted as part of this pilot assessment focused on the assessment of driving performance and safety skills. Eventually, the appropriate tests have been selected with an aim to understand the human elements / aspects which are considered as potential contributors towards the majority of road crashes occurring due to human fault and the tests selected for the present study include the following:

For Commercial Drivers:

1. Reaction Time (RT)
2. Determination Test (DT)
3. Adaptive Tachistoscopic Traffic Perception Test (ATAVT),
4. Cognitrone (COG)
5. INSSV i.e. Intelligence Test
6. Inventory of Driving related Personality Traits (IVPE)

For Non-Commercial Drivers:

1. Reaction Time (RT)
2. Cognitrone (COG)

These techniques were supplemented with the assessment of the job profile of the subjects through the conduct of an interview with the goods vehicle drivers.

4. METHODOLOGY

4.1 Sample Size and Characteristics of Subjects

The sample size considered in this pilot study was ranging around 349 commercial drivers and 335 Non Commercial drivers who are referred as 'subjects' in this study. Table-1 presents the profile of the drivers.

Table 1: Number of Subjects considered in the Study

S. No.	Type of Route Driving	Number of Drivers
1.	Transport Drivers (Commercial)	349
2.	Non-Transport (Private)	335
Total Samples		**684**

4.2 A Brief Description of the Tests

4.2.1 Vienna Test System: Vienna Test System has been used to assess the psychological parameters. This is a computerized psychometric assessment tool, which has been developed in Vienna, Austria. This system includes more than 150 psychometric tests in a single system. This system is a portable system used to assess the reaction time, personality, determination, perception, concentration level, the ability to perform multi-tasking coupled with the assessment of intelligence level of the subjects.

Figure 1: Instrumentation Deployed

5. FINDINGS OF THE ASSESSMENT

Findings for Commercial/Transport Vehicle drivers' are mentioned below:

1. **Results of Commercial Drivers**

- Total 349 Commercial/Transport vehicle drivers' has been assessed in this pilot study.
- Out of which 68% drivers are above the age of 40 and 32% drivers' are below the age of 40.
- Average age group of driver's are 45 years.

Test wise Results:

- **Results of RT:** Average Percentile rank Mean reaction time on **Reaction Time** is 15.08 and Average Percentile rank Mean motor time on **Reaction Time** is 18.45. It means average reaction time is found to be poor.

- **Results of COG**: Average Percentile rank of Mean time "correct rejections" is 29.76(sec) which falls in average category, Average Percentile rank of Sum "hits" is 32.62, which falls in average category. Average Percentile rank of Sum "correct rejections" is 19.33, which indicates poor performance. Average Percentile rank of Mean time "hits" is 35.32 (sec), which shows average performance. Overall we can say that the concentration and attention power of drivers are not good.

- **Results of DT:** Average percentile rank of Correct responses is 9.30, which indicates very poor performance, the average percentile rank of Incorrect responses is 47.79 which again indicates very poor performance, and the average percentile rank of omitted reaction is 18.58, which falls in poor category, so overall we can say that the determination, stress tolerance and multi tasking abilities are very poor among these drivers.

- **Results of IVPE:** Average percentile rank of emotional stability is 34.59 which falls in average category and indicates that they can handle their emotions, the average percentile rank of sense of responsibility is 15.55, which indicates that ownership is missing and they don't feel the responsibility towards the work, Average percentile rank of self control is 21.39, which shows that these drivers can be easily deviated and control on self is poor. The average percentile rank of honesty is 13.78, which again shows that they are not very honest. Overall the personality characteristics show that these drivers need to be trained in this area.

- **Results of ATAVT:** Average percentile rank of getting an overview is 3.31, which indicates very poor overview, and it is quite obvious that they are not quick in getting the overview.

- **Results of INSSV:** The average percentile rank for intelligence is 14.66, which again indicates poor performance which indicates low intelligence level, it may be a result of educational background and family background as well.

Overall analysis of the results shows that further special screening and training programme is advisable to improve the behavioural and cognitive aspects of the drivers to ensure the road safety.

2. **Results of Non - Commercial Drivers**

- Total 335 Commercial/Transport vehicle drivers' has been assessed in this pilot study.
- Out of which 59% drivers are above the age of 41 and 32% drivers' are below the age of 40.
- Average age group of driver's are 34 years.

Test wise Results:

- **Results of RT:** Average Percentile rank Mean reaction time on **Reaction Time** is 23.00 and Average Percentile rank Mean motor time on **Reaction Time** is 23.13. It means average reaction time is found to be poor.

- **Results of COG**: Average Percentile rank of Mean time "correct rejections" is 45.95(sec) which falls in average category, Average Percentile rank of Sum "hits" is 33.01, which falls in average category. Average Percentile rank of Sum "correct rejections" is 25.23, which indicates average performance. Average Percentile rank of Mean time "hits" is 49.07 (sec), which shows average performance. Overall we can say that the concentration and attention power of drivers are not very good.

Overall analysis of the results of non commercial drivers also shows that further special screening and training programme is advisable to improve the behavioural and cognitive aspects to ensure the road safety.

The analysis of the commercial and non commercial drivers brings out an interesting fact that there is not a big difference between these drivers, and both the groups need further training.

6.CONCLUSION

Based on the findings of this pilot project it is emphasized that it is worthwhile to carry out special screening and training of the both the Commercial and Non-Commercial vehicle drivers. This envisaged practice is expected to be useful in keeping skills over the driving capability of the drivers coupled with possible enhancement of their psychomotor skills if corrective measures are taken by them after undergoing training.

Thus this research study revealed that compulsory psychometric assessment and cognitive and behavioural training is required for all goods drivers for getting license renewal or for the new applicant licences especially for above 30 years.

The results obtained through different techniques of study have already been discussed in the respective sections. The road safety factors that emerged from the different techniques are summarised below to get an overall view of the safety increasing road safety for truck drivers in India.

It is not possible to assign any quantitative weightage to any of the attributes to determine their importance while indicating the findings except that the attributes figuring in large number of methods highlight their significance for driving. The study on Assessment of Driving Behaviour and Safe Driving Skills of drivers was made using psychometric tests which are considered one of the most representative techniques of assessing the psychomotor skills of drivers'. The main objective of the study was to identify areas that are crucial for driving and important in increasing road safety in India. The attributes identified in this study are alphabetically listed below –

- Concentration
- Determination
- Depth Perception
- Emotional Stability
- General Intelligence
- Honesty
- Memory
- Observation
- Reaction Time
- Stress Tolerance
- Sense of Responsibility
- Speed of Perception
- Self Control
- Visual Orientation

Customized Training for the drivers wherein we can provide training in the above mentioned areas can result into a better performance and possibly we will be able to meet the UNO vision 2020.

7. RECOMMENDATION AND DIRECTION FOR FURTHER WORK

For achieving UNO Mission Road Safety Vision - 2020, even one percent of drivers should not be spared for unsafe capabilities. For this there exists an urgent need for automated visual acuity testing for each applicant of refresher course trainee or learner / permanent license.

This report also discusses the challenges that countries face when setting or seeking to modify visual standards for drivers. These appear to relate directly to the difficulty of defining statistical thresholds of safe and unsafe drivers. While restricted licenses appear to strengthen visual standards for drivers. The recommendations emanated out of this study are to improve road safety in India can be reckoned as indicative and there is substantial scope to work further in the following directions.

- ✓ Quantification of the impacts of improved psychophysical traits on road safety and mobility in India.

- ✓ Assessing and giving proper training in cognitive and behavioural areas which are essential for Road Safety.

- ✓ Developing the complete framework for driver education and licensing in India.

- ✓ Addressing practical issues (differences of language, literacy level of applicants, etc.) in implementation of the proposed framework.