

# Development and Validation of a Psychological Scale for Work-Related Drivers

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## Abstract

Work-related drivers are in high demand in Nigeria because their services are needed in virtually all the private and public business sectors of the economy. Due to exposure to long hours of driving, work-related drivers are prone to vehicle crashes resulting in injuries, loss of man hours, or death. Psychological dimensions of driving have been implicated in literature as positive indicators to successful driving performance. However, there is a dearth of an indigenous psychological scale for assessing automobile drivers in Nigeria. This study was therefore designed to develop and validate a psychological scale for the selection of work-related drivers in Nigeria. This study utilized a cross sectional survey research design, and was carried out in metropolitan Lagos through pilot, main and validation studies utilising 715 participants in all. Using the inclusion criterion of  $\geq 0.40$ , a 26-item composite scale ( $\alpha = .80$ ) was identified. Further analysis revealed four psychological dimensions of driving. The psychometric properties of the four dimensions revealed coefficient alphas of 0.75 to 0.96. These dimensions correlated positively and significantly with other similar measures. The scale is useful for identifying behavioural dispositions of drivers in the work setting. The scale also has implications for selection, training, transfer and promotion of drivers.

**Keywords** – development, validation, work-related drivers, psychological dimensions, Nigeria

## 1. Introduction

Literature on automobile driving is replete with measurement instruments that are developed to assess the psychological traits of automobile drivers. A considerable proportion of these instruments were developed and utilized on the general driving population. For example, the Manchester Driver Behaviour Questionnaire (DBQ) by Reason, Manstead, Stradling, Baxter and Campbell (1990), the Multidimensional Driving Style Inventory by Taubman-Ben-Ari, Mikulincer and Gillath (2004), and the Driving Anger Scale (DAS) by Deffenbacher, Oetting and Lynch (1994). However, only a few of these instruments (for example Newnam, Greenslade, Newton & Watson, (2011); Salminen and Lahdeniemi, 2002) have considered the work setting in their study of automobile drivers. Because these instruments were developed in Western countries, they may not be suitable in assessing and predicting the performance of automobile drivers in the local work setting in Nigeria. This may not be unconnected with regional differences in the self-reported driving behaviour of European drivers as revealed in the study of Golias & Karlaftis (2002). These foreign tests may be culturally inadequate because the items may consist of technical terms and slangs that are relevant in the culture in which they were developed but could suffer misinterpretation when used in another culture. The selection decisions based on the results of administering such foreign tests may be unfair to applicants who are not successful in a selection process and this may impact negatively on the organization.

According to the International Test Commission (ITC), (2000), foreign tests need to go through a careful and usually time-taking adaptation procedure. This is because test adaptations for traffic-related purposes need special attention because traffic conditions, degree of motorization and driver attitudes may vary considerably between countries (Yasak & Esiyok, 2008). Also, due to differences in demographic structure, level of economic development, and uneven development in transport infrastructure (Odero & Zwi, 1995), it may not be appropriate to apply test instruments developed for use in other parts of the world. Additionally, the test scores obtained by a test taker on a foreign test may not be a true reflection of the abilities of the test taker. Therefore, selection of work-related drivers based on a foreign test may result in wrong selection decisions. Such an employee, if selected may be a potential risk to other road users and eventually a burden to the organization. Hence, there arose the need to develop a selection instrument for work-related drivers in Nigeria especially one that will be culture related. In order to solve the swamp of problems enumerated above, there is need to develop an instrument covering behavioural dimensions of driving in the work setting. In other words, the objective of this study focuses on the development of an instrument whose content will be psychological and which can be administered to work-related drivers at the point of selection and one that would be useful in identifying behavioural dispositions.

### 1.1 Work-related drivers in Nigeria

The increased economic activities in Nigeria which was occasioned by the oil boom between the periods of 1973-1977 witnessed demand for the services rendered by the organizations in the different sectors of the Nigerian business environment. Business activities expanded in leaps and bounds with manufacturing and services industries opening up in major cities of the country. The upsurge in business activities witnessed acquisition of official vehicles by public and private organizations. For example, the services sector made up of

banks, insurance companies, telecommunications and other allied companies embarked on vigorous marketing of their various products which requires movement of marketing personnel. To ease these movements, organizations purchased vehicles for chief executives, other key managers of the organizations and marketing officers. For example, investigations conducted prior to this study on the number of automobile drivers employed by banks operating in Nigeria revealed that an average of about thirteen thousand drivers were employed by all the banks in Nigeria as at the time of this study. The acquisition of official vehicles for each of the branches resulted in high demand for automobile drivers. It therefore became inevitable to employ automobile drivers whose pivotal role was to convey the staff of the marketing departments and other officers to their prospective clients and destinations. The role played by these drivers and the increasing demand for their jobs may have created a shortfall in the supply of work-related drivers for recruitment. The urgent need for drivers may have increased the tendency for these organizations to reduce the standards required for selecting work-related drivers. Selection decisions may thus be based on inadequate methods which may invariably have dire consequences on the profitability of the organizations through road accidents and loss of lives and properties. Increased profitability in organizations is possible when the best selection practices are adopted (Huselid 1995; Terpstra and Rozell 1993). The use of adequate and appropriate selection methods for selecting work-related drivers in Nigeria becomes necessary in view of the consequences a wrong selection procedure may produce.

Another consideration for the need of a culturally relevant selection test for work-related drivers is the outcome occasioned by loss of jobs in various sectors of the economy and the inability of a lot of fresh graduates to secure jobs after graduation. These resulted in career switch to areas of availability of jobs. Applicants who do not have the required driving knowledge, skills or experience, but who wish to change career due to the situation of the labour market may want to seize the opportunity of available vacancies for automobile drivers to apply for a job. How then do these organizations ensure that automobile drivers who are knowledgeable in the human aspect of driving and with the appropriate cognitive and behavioural abilities are screened and selected for employment and ultimately ensure successful driving performance? The answer lies in the development of an indigenous scale to identify psychological dimensions of driving in job applicants and this constitute the main objective of this study.

## **2. Method**

### **2.1 Procedure**

**2.1.1 Pilot Study.** A pilot study was initially reported in Malomo (2010) where a total of 363 items that were generated from a job analysis investigation were tested. The result of the pilot study revealed 58 items generated through face validation, content analysis and factor analysis.

**2.1.2 Main Study.** The items retained from the result of the analysis carried out on the pilot data were administered on 610 participants who were automobile drivers randomly drawn from six commercial banks. All participants were 100 percent male; age range varied from 19 years to 60 years with a mean of 39.5 years; driving experience ranged from 1 year to 39 years. A total of 568 questionnaires were returned. On close inspection of each questionnaire, some of them had some sections unfilled. These were discarded, leaving a total of 555 completed questionnaires. The reliability of the questionnaire was computed with Cronbach's (1951) coefficient alpha.

## **3. Results**

**3.1 Analysis.** The homogeneity of the items as a driver selection instrument was assessed by applying Cronbach's (1951) alpha coefficient statistic. According to Nunally (1978), Machin & Sankey (2008), an alpha value of  $\geq 0.70$  is considered satisfactory. In this present study, a coefficient of 0.80 was obtained indicating that the bank driver selection scale was reliable as a composite scale. Further reliability of the scale was computed by the split-half method and adjusted for length with the Spearman-Brown formula. Thus an obtained Spearman brown coefficient was 0.72. Responses to the 33 items obtained from the pilot study were subjected to Exploratory Factor Analysis (EFA) using Principal Component Analysis (PCA) with a varimax rotation method. The objective of using the PCA was to eliminate unreliable items from further analysis (Tronsmoen, 2008). The varimax rotation method was adopted for this present study because it is the widely used method of the orthogonal rotation and it is used when factors are not meant to correlate with each other. With the varimax rotation, the resultant solution yielded results that simply identified each variable with a single factor. To further reduce the number of items, items with loadings below 4.0 were suppressed in the analysis. The result was a 26-item composite Bank Driver Selection Scale.

**4.3.2 Factor Extraction and Retention.** Among the test for factor extraction and retention is the scree test. The scree test involves examining the graph of the eigenvalues and looking for the natural bend or break point in the data where the curve flattens out. The number of data points before the break is usually the number of factors to retain. However, in this study, the data points clustered together near the bend and it was difficult determining the point at which the curve flattens out. The method adopted by Costello & Osborne (2005) was used to set the number of factors to retain on the SPSS. Hence as suggested by Costello and Osborne (2005), factor analysis

was then rerun specifying four factors. These factors were rotated orthogonally by the normal varimax method (Kaiser, 1958). When the item loadings were compared, the extraction with the cleanest factor structure, with item loading  $\geq 0.4$  as, and with no cross loadings was retained. Table 1 below lists the final items derived with each item loading after four interpretable factors have emerged. The first factor is the Compliance dimension with 14 items whose factor loading fall between 0.419 and 0.615 with coefficient alpha of 0.76. The second factor is the Aggressive Driving dimension with 4 items whose factor loadings fall between 0.859 and 0.940 with coefficient alpha of 0.96. The third factor is the Judgment Error dimension with 4 items whose factor loadings fall between 0.850 and 0.883 with coefficient alpha of 0.94. The fourth factor is the Safety Consciousness dimension with 4 items whose factor loadings fall between 0.488 and 0.820 with coefficient alpha of 0.75. The list of items is presented in the appendix.

#### 4.3.3 Instrument Validation

The validation study was carried out by correlating each dimension (as revealed in the analysis of data) with four other measures as adopted by (Fletcher & Nusbaum, 2010; Dierendonck & Nuijten, 2010). These were: (a) Driving Error Scale (DES) by Parker, Reason, Manstead and Stradling (1995a). This scale measured 11 driving errors committed by automobile drivers. Some of the items were reworded while one item was deleted. (b) The short form 14 item Driving Anger Scale (DAS) (Deffenbacher, Oetting & Lynch, 1994) was administered to respondents so as to validate the aggressive driving dimension of the BDSS. Driving Anger Scale describes potentially anger provoking driving scenarios. Responses were obtained using a five-point Likert scale (1 = 'not at all' to 5 = 'very much'). (c) Safety Consciousness Scale (SCS) by Barling, Loughlin and Kelloway (2002). Responses were obtained using a five-point Likert format (1 = 'strongly agree' to 5 = 'strongly disagree'). The safety consciousness scale which consists of 7 items developed by Barling, Loughlin and Kelloway (2002) was administered for the purpose of validating the safety consciousness dimension of the BDSS. All items were included except for minor changes of some words to suit the purpose of this study. (d) Agreeableness Dimension of Costa and McCrae (1992) NEO Personality Inventory was adequate for use in validating the compliance dimension of the Bank Driver Selection Scale. It has 9 items and the responses were measured using the 5 point Likert-type (strongly agree =1 to strongly disagree = 5) format. Items 1, 3, 6, 7 were reversely coded.

**4.3.4 Validation Procedure.** The four other measures were administered to 610 automobile drivers along with the items obtained from the main study.

### 5. Discussion

The main objective of this study was to develop a psychological test that would be incorporated into the selection procedure of work-related drivers in Nigeria. Cronbach's (1951) coefficient alpha obtained was 0.80 for the composite scale indicating that the scale was reliable. The 33 items presented for the main study were reduced to 26 items in the final analysis with exploratory factor analysis. Factor extraction produced four factors. These are Compliance ( $\alpha$  .76) with 14 items, Aggressive Driving ( $\alpha$  .96) with 4 items; Judgment Error ( $\alpha$  .94) with 4 items and Safety Consciousness ( $\alpha$  .75) with 4 items.

The Compliance dimension which consists of 14 items explained 19.10 percent of total variance and it has implications for safety purposes. Compliance describes the adherence behaviour of an automobile driver with regards to complying with and obeying traffic rules and regulations prescribed by traffic regulatory authorities and the organization the drivers work for. All items were conceptually consistent with each other, resembling the component of compliance with a minimal exception to the following items "worn out tires may be managed until they burst", "a driver who feels sleepy may still manage to drive", and "when the traffic light turns green, a driver may blow the horn to alert drivers in front to move". However, these three items may be seen as compliance to safety policies from the point of view of the organization. Accordingly, this factor was named compliance. Still on the compliance factor, another item states: "worn out tires may be managed until they burst". This item is related to the maintenance of vehicles. A well designed and well-maintained vehicle, with good brakes, tires and well-adjusted suspension will be more controllable in an emergency and thus be better equipped to avoid collisions. Work-related drivers are expected to report faults and worn out parts in the vehicles they drive. This has to do with work safety policies that drivers are expected to comply with. This makes it pertinent for the inclusion of the compliance dimension in the selection procedure of automobile drivers in commercial banks. This is because the notion that driving a vehicle belonging to an organization such as a bank may be perceived as a privilege to disobey traffic rules and regulations. Hence, there is need to identify such applicants at the point of selection. The compliance dimension of the BDSS reported a significant positive correlation ( $r = .45$   $p < 0.01$ ) with the Agreeableness dimension of Costa and McCrae (1992) NEO Personality Inventory

The Aggressive Driving dimension consisted of 4 items and explained 13.97 percent of variance. The aggressive driving dimension with its four items was highly reliable at 0.96 and has implication for accident reduction. Aggression is the verbal or physical expression of anger by a driver of a vehicle on another driver. This is expressed in behaviours such as gesturing in anger or yelling at other motorist, making rude signs at another driver, chasing other cars, honking for longer periods, flashing light at another driver, exceeding the legal speed

limit, following too closely, unsafe lane changes, failure to obey traffic control devices (such as stop signs, traffic signals) and so on. Except for one item; “at night, there may still be need to obey traffic light”, all items were conceptually consistent with each other resembling the component of aggressive driving. All other three items measured aggressive driving. However, this item which corresponds more with compliance factor was retained in the aggressive driving factor because it has the highest loading amongst all the items, and may be considered as an aggressive act in some circumstances such as forcing one’s way through the traffic light. Removing it from the aggressive driving factor will reduce the coefficient alpha of the factor. The aggressive driving dimension reported a significant positive correlation ( $r = .34$   $p < 0.01$ ) with the driving anger scale of Deffenbacher, Oetting and Lynch (1994).

Factor three which is the Judgment Error dimension consisted of 4 items. The judgment error dimension with its four items was highly reliable at 0.94 and has implications for accident reduction and successful driving performance. Judgment error denotes an individual’s error of judgment of speed, error in visual judgment, error of judgment of spacing, error of judgment of distance, error of judgment of fluid level, and general assumptions of safety, traffic rules, and attitude to work. One of the items on the judgment error dimension is “A driver who drives within the speed limit is not smart” was to measure the driver’s score on her/his level of judgment error in relation to speed. This is so especially as drivers who drive work vehicles were found to drive more distances and usually under pressure to complete their assignments within a stipulated time frame. Universally, traffic crashes affect the performance of drivers whether they drive on a private basis or professionally. It is therefore necessary for the management of commercial banks to employ every effort in making sure bank drivers commit less error while driving. The judgment error dimension reported a significant positive correlation ( $r = .13$   $p < 0.01$ ) with the driving error scale of Deffenbacher, Oetting and Lynch (1994).

The Safety Consciousness dimension consists of four items and explained 8.42 percent variance. Safety Consciousness refers to the behaviour of an automobile driver that denotes awareness of danger and harm and how to avoid them. It manifests in complacency, inattention, taking precautions. The safety consciousness dimension with four items was reliable at 0.75 and can be used for automobile drivers in the banking industry. All the items measure safety consciousness. An example is “laws requiring vehicle safety belt use may be very helpful in reducing injuries”. The dimension of safety consciousness as an important aspect of driving was confirmed in the study of Blair, Watts, Torabi and Seo (2004). These authors developed subscales of motor vehicle safety with items to measure safety of young drivers. In line with the safety consciousness dimension of the bank driver selection scale, Blair, Watts, Torabi and Seo (2004) also generated items to measure seat belt usage and driving under the influence of alcohol. These items were also reflected in the Bank Driver Selection Scale as “alcohol may keep drivers alert” and “laws requiring safety belt use may be very helpful in reducing injuries”. Alcohol use is one of many activities that can negatively affect one or more of the skills or behaviours a driver employs while driving (Fazzalaro, 1998; Zador, 1991; Zwi, 1993; Ehikhamenor and Ojo, 2004). The safety consciousness dimension of the BDSS reported a significant positive correlation ( $r = .49$   $p < 0.01$ ) with the safety consciousness scale of Barling, Loughlin and Kelloway (2002).

### 5.1 Conclusion

In conclusion, a scientifically reliable and valid selection scale has been developed by this author. Based on the findings in this present study, it is recommended that organizations adopt a holistic approach in selection. Organizations who want to recruit automobile drivers should imbibe the culture of using paper and pencil psychological instruments to support the current methods of physical driving tests and oral interview when screening automobile drivers for selection. Sole reliance on the physical driving test and interview methods could be subjective.

Despite the fact that this study followed all the necessary procedure in test development, the researcher acknowledges some limitations of the study. First is the use of Lagos State as the setting of the study. This may affect the generalisability of this study to other parts of Nigeria. This is due to the peculiar traffic conditions of Lagos. However, driving is a universal activity; hence most of the items can be used with caution. Also, efforts were made to involve as participants, drivers of various ethnic affiliations in Nigeria whose responses are likely to reflect the culture of driving in those areas. It can be useful in cities with high vehicular movement. In addition, for this test to be useful with drivers from other sectors of the economy it is pertinent to carry out a cross validation study.

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