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AN ASSESSMENT OF TRAINING ON THE SAFETY OF BODA BODA OPERATORS IN KENYA: CASE OF EMBU COUNTY

Elizabeth Simbii Ngesa[1*] & Dr. Isaac M. Abuga (PhD)[2]

[1*]Scholar, Mount Kenya University, Kenya

[2]Senior Lecturer, Mount Kenya University, Kenya

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ABSTRACT

Motorcycle transportation, commonly known as Boda-boda, has become a crucial method for ensuring that a significant portion of the population living in regions where motorcycle use is prevalent can actively engage in socioeconomic endeavors. The purpose of the study was to establish the effectiveness of training on the safety of boda-boda operators in Kenya. A Case Study of Embu County This research was grounded in the theory of structural functionalism, with the supporting theory being the problem-solving theory. The study employed a descriptive cross-sectional study design, complementing the various approaches to the collection of data that have a qualitative and quantitative nature. This study was considered boda boda operators within Embu County as the target population from which research data was be derived. The target population was 15,416 and the sample size was 375 respondents. The snowball approach was significant in identifying and mapping additional areas where the boda boda cyclist assembly occurs, with those areas being marked as clusters. The research findings were visually presented using tables. The analysis revealed that knowledge acquisition and practical skill development collectively contributed a significant 57.7% to the improved safety of boda-boda operators. In conclusion, the study emphasized the crucial role of comprehensive training and practical skill development in enhancing the safety of boda boda operators. To enhance boda boda operators' knowledge and understanding, it is recommended to implement targeted educational programs focusing on traffic rules, road signs, and language proficiency. Practical skills among boda boda operators can be enhanced through development of mandatory refresher courses and providing subsidized training opportunities and integrating customer service training.

Keywords: *Knowledge Acquisition and Understanding, Practical Skills Advancement, Safety Boda Boda Operators*

INTRODUCTION

Motorcycle transportation, often referred to as "Boda-boda," has emerged as an indispensable means of enabling a substantial segment of the populace residing in areas with high motorcycle usage to participate actively in socioeconomic activities. The increasing prevalence of motorbikes as a preferred means of public transit is mostly attributable to their unique transportation advantages, which encompass manoeuvrability, the capacity to traverse unpaved roads, and the ability to fulfil transportation requirements. Gatebe, Kahuthia-Gathu, and Luchidio (2013). During rush hour, boda-bodas significantly contribute to the mitigation of traffic congestion in numerous urban regions. They are easily navigable along narrow

village paths that are unavailable to quicker modes of transportation and are available around the clock (Kitara, 2011).

Notwithstanding the manifold benefits attributed to boda-boda transit, including cost-effectiveness, velocity, traffic bypass capability, compatibility with tiny peri-urban thoroughfares, and continuous availability, the motorcycle-traffic environment presents inherent safety risks. The considerable quantity of motorbikes present on the road presents considerable hazards to other motorists (Jadaan et al., 2018; WHO, 2017). Data from the World Health Organization indicate that motorcyclists account for 43% of all fatalities in South-East Asia (WHO, 2018). As an illustration, the Committee for National Traffic Safety in Vietnam documents about 8,500 fatalities annually attributable to traffic accidents; over 90 percent of these casualties are motorcyclists and their passengers (WHO, 2018). Furthermore, it is worth noting that the African continent has the highest road traffic fatality rate of 24.1 per 100,000 inhabitants. Among the road user groups most susceptible to harm, motorcyclists comprise approximately a quarter (23 percent) of all road traffic fatalities worldwide (WHO, 2018).

Motorcycle taxis were not exclusive to developing nations; they were also prevalent in developed European economies, where car ownership was comparatively abundant and public transportation services were more dependable and frequently of superior quality in comparison to those in developing countries (Tuffour & Appiagyei, 2014). Additionally, Tuffour and Appiagyei (2014) found that developed economies of Europe had a greater degree of adherence to traffic regulations than developing countries. However, they failed to provide justifications for the lack of adherence observed in low-income economies. This research aimed to provide the elucidation that was absent in the work of Tuffour and Appiagyei. Additionally, bikes were present in France, as Pierre's research on the unexpected growth and cost-effectiveness of motorcycles in the city of Paris confirmed (Pierre, 2016). However, Pierre's research focused primarily on the costs and advantages analyzed in terms of time and manoeuvrability, ignoring the critical problem of stakeholder safety in the industry.

Consistent with other geographical areas, African countries often have a scarcity of knowledge regarding the minimum requirements for formal rider training. Motorcycles, colloquially referred to as "BodaBoda," emerged as a prominent mode of public transit in East African nations including Kenya, Tanzania, and Uganda, according to historical sources (Hung, Stevenson & Ivers, 2016). An examination of themes uncovered by a research done in Tanzania revealed that, among other methods, motorcyclists advocated for the importance of education and training for motorcycle operators as a means to reduce motorcycle-related accidents. Despite the increasing frequency of motorcycle accidents, Kenya still lacks comprehensive national data concerning the percentage of boda-boda riders who have completed official training. A significant rise in boda-boda-related fatalities was observed in 2019, with the number rising from 750 in 2018 to 959. According to the Road Safety Status Report, motorcycle riders accounted for 24 percent of all road traffic fatalities in 2016 (WHO, 2016). Additionally, the number of fatalities resulting from motorized two-wheeler and three-wheeler accidents was 26% in 2018.

A lower incidence of accidents and reduced severity of injuries among motorcycle riders are outcomes associated with training experience, according to a study by Kardamanidis, Martiniuk, Ivers, Stevenson, and Thistlethwaite (2017). Notable is the fact that formal rider instruction had not been obtained by an overwhelming majority (92 percent) of the motorcyclists who participated in this study. Instead, they obtained those abilities via personal experience, acquaintances, or relatives. A significant proportion of drivers in Nigeria

who possess valid licenses have never attended authorized training institutions or fulfilled the legally mandated instruction, as per one survey. This lack of formal education is not an anomaly. The probability of accidents is heightened when operators lack the requisite credentials, which increases the possibility that they would violate traffic laws and regulations (Peck, 2011). Unofficial training was reported by a significant 85 percent of motorcyclists, according to recent research, with only 15 percent having successfully finished such instruction (Nyuma & Sao, 2020). Furthermore, it was found in a distinct inquiry that 37.3% (n = 231) of commercial motorcyclists recognized the need for enhancements in teacher preparation for motorcycles. This discovery suggests that although training programs are accessible, they may not provide all pertinent information (Nickenig, Byiringiro, & Staton, 2020).

Statement of the problem

Following the 2014 National Transport and Safety Authority Regulations on the Operation of Motorcycles, motorcycle operators are required to possess a valid driver's license issued by the NTSA. Merely completing a driver's education at an accredited driving institution and attaining the necessary riding abilities does not meet the requirements in the absence of a valid driver's license. The enforcement of this regulation falls under the purview of law enforcement agencies as well. Research undertaken in Kenya has revealed that a considerable percentage of motorcyclists are either untrained or have received insufficient instruction, which leads to imprudent operation and disobedience of established traffic protocols (Nyachieo, 2015; Moraa, 2010; Odera, 2009). The predicament is additionally worsened by the lack of designated motorcycle lanes on roads in Kenya, which forces motorcyclists to vie with other cars for road space (Saidi & Mutisto, 2013). The training program needs to provide participants with a comprehensive comprehension of safety ideas, rules, and optimal methodologies that are pertinent to their particular positions and work settings. Participants must be equipped with the requisite knowledge to recognize potential dangers, evaluate associated risks, and render well-informed judgments to safeguard one another.

The Ministry of ICT, Innovation, and Youth Affairs, in conjunction with the Ministries of Public Service and Gender, Interior, and National Government Coordination, initiated a training program in 2021 to address the growing road safety issues in the Motorcycle Public Transport (Boda Boda) Sector of Kenya. To educate around 1.4 million riders across the country, this endeavor was carried out in collaboration between the National Youth Service (NYS) and the National Transport and Safety Association (NTSA) (Kenya Roads Board Strategic Plan 2023-2027). Despite concerted attempts, accidents involving motorcycles or boda boda remain an urgent issue in Kenya. Concerns have been raised by the National Transport Safety Authority (NTSA) on the increasing frequency of accidents associated with boda-boda operators over the last four years. As of 2022, the NTSA has classified motorcycles as the most hazardous method of transportation. Based on data from the NTSA (2023), boda-bodas were responsible for the greatest number of fatalities in 2022, totaling 1,209; this represents an increase from the 1,154 fatalities recorded in 2021. Failure to adequately address this condition may result in the county continuing to suffer roadside fatalities attributable to safety-related incidents. Consequently, the purpose of this research is to determine the efficacy of safety training for boda-boda operators in Kenya. A case study on the county of Embu.

Research Objectives

i. To assess the extent of knowledge acquisition and understanding of the safety of boda boda operators in Kenya.

ii. To establish the effect of practical skills advancement on the safety of boda boda operators in Kenya.

LITERATURE REVIEW

Empirical Literature

Extent of knowledge acquisition and Safety of boda boda operators

Prior research has proven that formal education and training are essential components in equipping motorcyclists with the necessary skills to efficiently drive and manage a motorcycle. There is a prevalent belief that the distinctive maneuverability of motorbikes, combined with the rider's vulnerability to many external factors, necessitates a considerable level of expertise, which may be acquired most efficiently through structured training programs. Notwithstanding the substantial significance attributed to these undertakings, there has been a noticeable scarcity of research concerning the evaluation of the effectiveness of motorcycle rider education and training and its implications for road safety as a whole (Singh & Mattoo, 2020; Mayhew, Simpson, Wasiams & Ferguson, 1998).

Kemei, Sakata, and Nyaboga (2022) conducted a study with the aim of assessing the influence of formal motorcycle rider training and safety awareness on the overall safety of motorbike riders in the municipality of Eldoret. Data was collected for the study concerning the demographic characteristics of motorbike riders, their levels of formal education, safety knowledge, and the influence of these factors on the safety of motorcycle transportation. A sample of 370 individuals was selected from the target population of 10,000 for the purpose of this experiment, utilizing the Krejcie and Morgan Table. A descriptive survey approach is employed in this study, alongside basic random sampling and stratified sampling methodologies, to gather data from a sample of 370 respondents. The findings of the study revealed some significant trends, such as the preponderance of young adults (85.1 percent) among motorbike riders, primary school graduates (81.6 percent), and married individuals (81.9 percent). It is noteworthy to emphasize that an overwhelming majority of motorcycle riders (82.4 percent) did not possess a valid rider's license or formal training. Moreover, a significant percentage of the respondents (69.5 percent) indicated that they had been involved in the activity of riding motorcycles for a period ranging from four to five years. A total of 44.6 percent of this cohort had encountered unemployment in the preceding year, and 41.1 percent were employed in the informal sector. Furthermore, it was discovered that although 64.9% of the participants owned the motorcycles they operated, 67.3% of these vehicles lacked insurance coverage. The study's research, which utilized Chi-Square testing and binary logistic regression, revealed noteworthy results about the association between formal training, ownership, and accident participation.

Motorcycle safety emerges as a prominent issue in the realm of road safety. Although motorcyclists comprise a modest 0.6 percent of the total miles driven by autos and just 3 percent of traffic (National Safety Council, 2016), their operation is significantly more complex than that of a conventional automobile. A considerable number of motorcyclists, meanwhile, lack a comprehensive comprehension of the complexities inherent in motorcycle operating. Proficiently operating a motorcycle necessitates a considerable set of abilities, such as understanding the principles of countersteering, effectively applying front and rear brake force, managing traction and power distribution, and maintaining the elevated level of awareness and concentration required to navigate through congested traffic environments dominated by larger vehicles (Elliot, Baughan, Broughton, Chinn, Grayson, Knowles & Simpson, 2003). The findings of a recent study by Ganem and Fernandes (2020) revealed that a considerable percentage of motorcycle riders, excluding non-professionals, are male. This discovery might provide an explanation for the apparent higher incidence of motorcycle

accidents among males. However, the study failed to conduct a comprehensive investigation into the correlation between training and road safety.

Initial investigations into the effectiveness of rider training programs produced favorable outcomes, indicating that participants who had completed structured training shown a reduced probability of crashes when compared to those who had not participated in such programs (Ivers, Sakashita, Senserrick, Elkington, Lo, Boufous & De Rome, 2016). Nonetheless, further scrutiny cast doubt on the dependability of numerous preliminary findings, thereby highlighting methodological constraints. Collins (1979) and Satten (1980) identified certain minor problems, which encompassed insufficient control over critical variables including rider preparedness and exposure, as well as limited study sizes. Mullin, Jackson, Langley, and Norton (2000) assessed a variety of factors that influence the probability of crashes in New Zealand by employing a population-based case-control methodology. The results of their research suggested that the level of danger faced by motorcyclists aged 25 and older was much reduced in comparison to those aged 15 to 19.

Recent study has examined a multitude of factors that could potentially contribute to the probability of road injuries. One such element is rider training, which encompasses both novice and experienced cyclists (Moller, Senserrick, Rogers, Sakashita, De Rome, Boufous & Ivers, 2020). Chen, Lin, and Chen (2018). Research indicates that commercial motorcycle riders, predominantly comprised of young males, partake in perilous activities include exceeding speed limits, transporting a significant number of passengers, and neglecting traffic restrictions (Wankie, Al-Delaimy, Stockman, Alcaraz, Shaffer & Hill, 2020, citing Johnson, 2012; Oginni et al., 2009). Considerable academic research emphasizes the positive outcomes associated with structured rider training programs. These include encouraging the use of protective equipment, discouraging potentially dangerous individuals from joining the motorcycle community, and ultimately reducing the number of crashes among inexperienced riders (Singh & Mattoo, 2020).

Practical skills advancement and Safety of boda boda operators

The objective of the research undertaken by Yogo (2018) in the city of Kisumu was to investigate the relationship between regulatory compliance and training in motorcycle transportation services. The study's precise aims were as follows: determine the socioeconomic status of boda boda riders; examine the influence of training (or lack thereof) on adherence to safety regulations; and compare the level of compliance with safety regulations between untrained and trained riders. The research employed a multi-stage cluster sampling methodology, in which clusters were generated using site mapping. Purposive stratified sampling was utilized in this study, wherein the population was divided into discrete groups (or strata) according to common attributes, namely motorcycle riders. Observations, checklists for key informant interviews (KIIs), questionnaires, and focus group discussions (FGDs) were utilized to collect data. The data analysis was conducted using the Statistical Package for Social Science (SPSS), which incorporated descriptive statistics such as frequency distribution tables, percentages, and cross-tabulations. The findings revealed a preponderance of male participants and unsatisfactory compliance among riders, which was generally ascribed to their inadequate formal training (47 percent had completed such instruction). Moreover, the vast majority of participants boasted some degree of formal education. Significantly, safety compliance was connected with motorcycle ownership, since the majority of motorcycle owners had completed the necessary training.

Research was undertaken by Luchidio (2015) in Kakamega County to evaluate the standards of safety and training in the motorbike transportation industry. A simple random sample technique was employed to collect the data, whereby 480 questionnaires were handed to law

enforcement personnel, health facilities, and boda boda operators. The findings of the research indicated that a considerable percentage of boda boda operators were conducting business without legitimate licenses; specifically, 35.6% possessed the requisite permissions, which violates the Kenyan Traffic Act. In addition, it was discovered through the investigation that 51% of the operators had obtained their motorcycle riding expertise via apprenticeships, 33% had undergone instruction at driving schools, and 16% had engaged in self-study. Significantly, a bare majority of boda boda operators (61 percent) lacked road safety training. Furthermore, the findings of the research emphasized that certified drivers who had received instruction at driving schools demonstrated an enhanced comprehension of the potential dangers and risks involved with boda boda operation, which prompted them to comply with road safety protocols. On the contrary, operators who had not undergone safety training included 53% of those involved in accidents, while those who had received training comprised 47%.

Theoretical Framework

Theory of Structural Functionalism

The aim of the sociological theory known as structural functionalism is to elucidate the underlying factors that govern the functioning of society. This is achieved by an examination of the interrelationships among the various social constructs that constitute a given civilization. Social interactions are regulated by social systems, which are predicated on generally regular patterns of society activity. Each discrete construction fulfills a unique social function that aids in the harmonious functioning of the entire civilization. The concept prioritizes the conservation of various elements comprising a social system, such as norms, cultural practices, institutions, frameworks, and organizations. The functions and contributions of each component are meticulously evaluated (Burrell & Morgan, 2017). Comparable to society at large, the road and transport infrastructure in Kenya has an extensive number of units or components, each fulfilling a distinct function in enabling the overall functioning of the system. The study operates under the premise that the effective collaboration of these diverse institutions in addressing safety-related concerns is crucial for guaranteeing the road transport system's sustainability in the long run, with a particular focus on safety.

The problem-solving theory

The emergence of the boda boda motorbike transport sector has revolutionized the transportation landscape by addressing challenges that conventional taxis were unable to surmount. This transformation can be effectively analyzed through the lens of problem-solving theory, a cognitive process designed to facilitate the transition from an undesirable state to a desirable one. Rooted in logic and reason, this capability evolves from infancy to adulthood, enabling individuals to learn from their environment and devise strategies to meet their physiological, psychological, cultural, and social needs (D'Zurilla & Nezu, 1999). In essence, the inherent nature of existence demands continual problem-solving to navigate life's complexities, making this theory particularly relevant to the boda boda sector. The problem-solving theory posits that human life is fundamentally a series of problem-solving activities, a concept that is vividly illustrated in the boda boda industry. Heppner and Petersen (1982) emphasized that life is a continuous effort to solve problems, where individuals adapt to external conditions to achieve optimal satisfaction. This theory underscores the adaptability and resilience required to operate in the boda boda sector, where operators constantly negotiate traffic, weather, and customer demands. The ability to swiftly and effectively address these challenges is a testament to the problem-solving capabilities inherent in the operators and the sector as a whole.

Conceptual Framework

The dependent variable for this specific investigation was concern the safety of boda boda operators, whereas the independent variable was center on the efficacy of training. The visual depiction of the conceptual framework is presented in Figure 1.

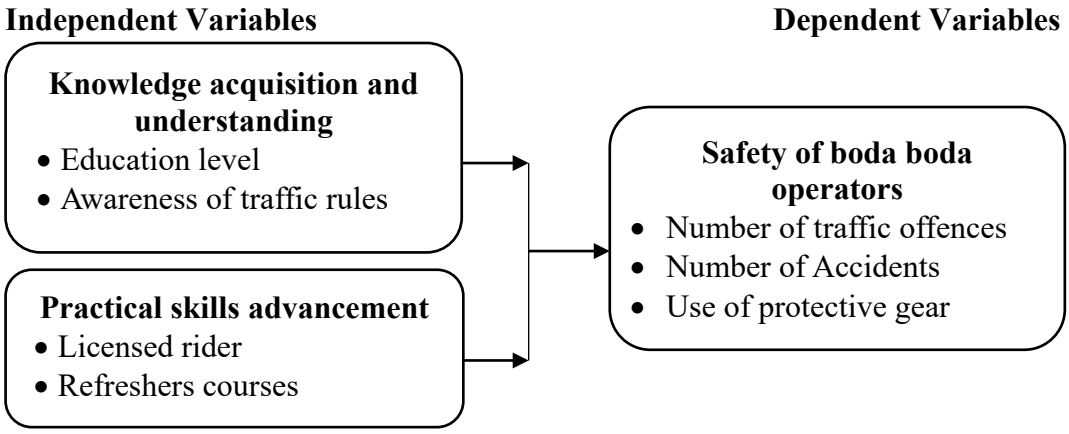

Figure 1: Conceptual Framework

Source: Researcher (2023)

RESEARCH METHODOLOGY

The research utilized a descriptive cross-sectional study design, supplemented by a variety of qualitative and quantitative data collection methods. The target population for this study consisted of 15496 boda boda operators located in Embu County. The snowball method was used to locate and map areas where boda boda cyclists congregate and labeling those regions as clusters. A sample size calculator was to determine the right sample size of 376 (Creative Research Systems, 2013). The researcher employed proper confidence intervals and levels of assurance. Following their entry, the system computed the sample automatically. By establishing a confidence level of 5 and a confidence interval of 95%, the resulting sample size was 375. To gather data for the study, a questionnaire was utilized. Analysis was conducted using descriptive statistics to get the mean and standard deviation of each variable and inferential statistics, including correlation and regression, to determine the nature of the relationship between boda boda operator safety and the effectiveness of training.

FINDINGS AND DISCUSSIONS

Respond Rate

The study achieved a response rate of 85.6%, with 321 participants responding out of a total sample size of 375. This high response rate indicates robust engagement from participants in providing data and insights into various aspects of boda boda operators' knowledge, skills, behaviors, attitudes, and perceptions of training programs.

Knowledge acquisition and understanding

The current study also examined the participants' knowledge acquisition and understanding in relation to their role in the boda boda transport industry. This aspect of the research aimed to assess various dimensions of their knowledge and competencies that are critical for their job performance. The study findings, as summarized in Table 6, provide detailed insights into the participants' self-assessed knowledge and understanding across several key areas.

The analysis reveals that participants generally considered their education level to be highly significant for their job. This statement received a mean score of 4.0810 with a standard deviation of 1.29167, indicating that most respondents agreed or strongly agreed, acknowledging the importance of their educational background in performing their duties effectively. Regarding awareness of traffic rules, the study found that participants were less

confident. The mean score for awareness of traffic rules was 2.8723 with a standard deviation of 1.65620, suggesting a moderate level of agreement and highlighting a potential area for improvement in traffic rule awareness among the operators.

In terms of understanding road signs, participants reported a better grasp. The understanding of road signs had a mean score of 3.4922 and a standard deviation of 1.45154, indicating a relatively higher level of agreement and suggesting that most operators feel reasonably knowledgeable about road signs. The ability to use both English and Kiswahili languages received a mean score of 3.3551 with a standard deviation of 1.65030. This reflects a moderate level of linguistic competence, indicating that while many participants can use both languages, there is still a significant variation in their proficiency levels.

Knowledge about motorcycle maintenance and basic repairs was also assessed, with the mean score for this knowledge being 3.4206 and a standard deviation of 1.66792. This suggests that participants have a fair level of knowledge in this area, though there is room for further skill enhancement. The study found that participants generally kept themselves updated with changes in traffic laws and regulations. The commitment to staying informed about relevant legal and regulatory updates had a mean score of 3.7788 and a standard deviation of 1.48881, indicating a strong commitment to staying informed about relevant legal and regulatory updates.

These findings provide a comprehensive overview of the participants' self-perceived knowledge and understanding, highlighting areas of strength as well as potential gaps that could be addressed through targeted training and educational initiatives. The varying mean scores and standard deviations across different knowledge areas underscore the diversity in participants' competencies and suggest targeted areas for further development.

Table 1: Knowledge acquisition and understanding

	N	Min	Max	Mean	Std. Dev
My education level matters a lot in this job	321	1.00	5.00	4.0810	1.29167
I am aware of all traffic rules	321	1.00	5.00	2.8723	1.65620
I have a better understanding of road signs	321	1.00	5.00	3.4922	1.45154
I can use both English and Kiswahili languages	321	1.00	5.00	3.3551	1.65030
I am knowledgeable about motorcycle maintenance and basic repairs.	321	1.00	5.00	3.4206	1.66792
I keep myself updated with any changes in traffic laws and regulations.	321	1.00	5.00	3.7788	1.48881
Valid N (listwise)	321				

Source: Field Data (2024)

Practical skills advancement on the safety of boda boda operators

The current study also assessed the practical skills advancement of boda boda operators, focusing on various aspects that contribute to their safety on the road. The study findings, as summarized in Table 2, provide a detailed understanding of the participants' self-assessed practical skills and their implications for safety. The analysis reveals that the participants' possession of a rider's license had a mean score of 2.9751 with a standard deviation of 1.75695. This indicates a moderate level of agreement, suggesting that not all operators might have a formal rider's license, which is crucial for legal and safety reasons.

Regarding the attendance of annual refresher courses, the study found that participants reported a lower engagement. The mean score for attending refresher courses annually was

2.3053 with a standard deviation of 1.61253, highlighting a potential area for improvement in continuous skill development and safety training.

Participants rated their efficiency and effectiveness on the road highly, with a mean score of 4.2523 and a standard deviation of 1.17335. This suggests a strong sense of confidence and self-assessed competence in their road skills, which is essential for safe and effective riding. When it comes to experience, the study found that having over five years of motorcycle riding experience had a mean score of 2.6791 with a standard deviation of 1.74100. This indicates a moderate level of experience among the participants, with a significant number having less than five years of riding experience.

Regular practice of defensive driving techniques had a mean score of 2.6511 and a standard deviation of 1.73828. This reflects a moderate level of engagement in defensive driving practices, suggesting that there is room for increased emphasis on these techniques to enhance safety. The study found that participants felt fairly confident in handling emergency situations while riding, with a mean score of 3.8536 and a standard deviation of 1.52081. This indicates a relatively high level of confidence, which is crucial for managing unforeseen incidents on the road.

These findings provide a comprehensive overview of the practical skills advancement among boda boda operators, highlighting strengths in self-assessed road efficiency and emergency handling, while also identifying areas for improvement such as license acquisition, refresher course attendance, and defensive driving practices. Addressing these gaps through targeted training programs could significantly enhance the safety and effectiveness of boda boda operators.

Table 2: Practical skills advancement on the safety of boda boda operators

	N	Min	Max	Mean	Std. Dev
I have a rider's license	321	1.00	5.00	2.9751	1.75695
Attend refresher courses annually	321	1.00	5.00	2.3053	1.61253
I am very efficient and effective on the road	321	2.00	5.00	4.2523	1.17335
I have over 5 years of motorcycle riding	321	1.00	5.00	2.6791	1.74100
I regularly practice defensive driving techniques.	321	1.00	5.00	2.6511	1.73828
I am confident in handling emergency situations while riding.	321	1.00	5.00	3.8536	1.52081
Valid N (listwise)	321				

Source: Field Data (2024)

Safety of the Boda Boda Operators

The current study also assessed the safety outcomes related to boda boda operators, focusing on various factors that contribute to their performance and behavior on the road. The study findings, as summarized in Table 3, provide insights into how different factors correlate with safety outcomes among operators. Participants who had received training were perceived to have fewer traffic offenses, with a mean score of 4.2710 and a standard deviation of 1.17980. This indicates a strong perception that training contributes significantly to reducing traffic offenses among operators.

Operators who maintained good relationships with customers were perceived to record fewer offenses, with a mean score of 3.7290 and a standard deviation of 1.48263. This suggests that interpersonal skills and customer relations play a role in mitigating traffic violations. Possessing a rider's license was associated with fewer offenses, as indicated by a mean score

of 4.0717 and a standard deviation of 1.33855. This highlights the importance of legal certification in promoting adherence to traffic regulations among operators.

Higher education levels were also perceived to correlate with fewer traffic offenses, with a mean score of 3.8629 and a standard deviation of 1.53498. This suggests that education may contribute to better understanding and compliance with traffic laws. Regarding accidents, trained operators were perceived to cause fewer accidents, with a mean score of 3.8629 and a standard deviation of 1.43828. This underscores the preventive role of training in reducing road accidents involving boda boda operators.

Operators with good customer relationships were also seen to record fewer accidents, with a mean score of 3.7944 and a standard deviation of 1.56767. This highlights the potential impact of customer interaction on safety outcomes. Those possessing rider licenses were perceived to cause fewer road accidents, with a mean score of 4.1340 and a standard deviation of 1.36844. This further emphasizes the importance of legal certification in promoting safe riding practices.

Operators with rider licenses were reported to wear protective gear most of the time, as indicated by a mean score of 3.6636 and a standard deviation of 1.53467. This suggests a positive correlation between legal certification and adherence to safety practices. Similarly, operators with higher education levels were perceived to wear protective gear most of the time, with a mean score of 4.0841 and a standard deviation of 1.37242. This indicates that education may also influence safety behaviors such as wearing protective gear.

These findings provide a comprehensive overview of the factors influencing safety outcomes among boda boda operators. They underscore the importance of training, legal certification, interpersonal skills, and education in promoting safer practices on the road. Addressing these factors through targeted interventions could contribute significantly to enhancing the overall safety and professionalism of boda boda operations.

Table 3: Safety of the Boda Boda Operators

	N	Min	Max	Mean	Std. Dev
Those trained have fewer traffic offenses	321	1.00	5.00	4.2710	1.17980
Those with good relationships with customers record fewer offenses	321	1.00	5.00	3.7290	1.48263
Those who possess rider licenses commit fewer offenses	321	1.00	5.00	4.0717	1.33855
Those with higher education levels commit fewer traffic offenses	321	1.00	5.00	3.8629	1.53498
Those trained rarely cause accidents	321	1.00	5.00	3.8629	1.43828
Those with good relationships with customers record fewer accidents	321	1.00	5.00	3.7944	1.56767
Those who possess rider licenses cause fewer road accidents	321	1.00	5.00	4.1340	1.36844
Those who possess rider licenses wear protective gear most of the time	321	1.00	5.00	3.6636	1.53467
Those with higher education levels wear protective gear most of the time	321	1.00	5.00	4.0841	1.37242
Valid N (listwise)	321				

Source: Field Data (2024)

Inferential analysis

Correlations

Table 4 presents the correlation matrix showing the relationships between different constructs measured in the study. Each cell in the table displays Pearson correlation coefficients, significance levels (p-values), and the number of cases (N) analyzed. Safety of the boda boda operators correlates positively with knowledge acquisition and understanding ($r = 0.466$, $p < .01$), practical skills advancement ($r = 0.498$, $p < .01$). This indicates that operators who report better knowledge, skills, and positive attitudes also perceive higher safety levels in their operations.

Table 4: Correlations

		Knowledge acquisition and understanding	Practical skills advancement
Knowledge acquisition and understanding	Pearson Correlation	1	.329**
	Sig. (2-tailed)		.000
	N	321	321
Practical skills advancement	Pearson Correlation	.329**	1
	Sig. (2-tailed)	.000	
	N	321	321
Safety of the Boda Boda Operators	Pearson Correlation	.466**	.498**
	Sig. (2-tailed)	.000	.000
	N	321	321

Source: Field Data (2024)

Regression Analysis

Model Summary

Table 5 summarizes the results of a regression analysis conducted to explore the relationship between predictor variables and the dependent variable of interest. The multiple correlation coefficient (R) of 0.615 indicates a moderate positive correlation between the predictors and the dependent variable. This suggests that the included variables collectively explain a significant portion of the variability in the dependent variable. The coefficient of determination (R Square) is reported as 0.378, indicating that approximately 37.8% of the variance in the dependent variable is accounted for by the predictors in the model. This suggests a moderate level of explanatory power, highlighting that while the predictors explain a substantial portion of the variability, there are additional factors influencing the dependent variable not captured by the model.

The Adjusted R Square, which takes into account the number of predictors and adjusts for the model's complexity, is slightly lower at 0.370. This adjustment reflects a more conservative estimate of the explained variance but still underscores the model's capability in accounting for variability in the dependent variable. The standard error of the estimate, 4.40499, indicates the average amount of error in the predictions made by the model, providing a measure of how well the model fits the data points.

Change statistics reveal insights into the incremental contribution of the predictors to the model's explanatory power. The R Square Change of 0.378 indicates the increase in explained variance when the predictors are added to the model, reinforcing their significance in influencing the dependent variable. The F Change statistic of 48.036 tests the overall significance of the regression model, suggesting a strong relationship between the predictors

and the dependent variable. This statistic is supported by a significant p-value associated with the F test, underscoring the reliability of the model's findings.

The regression analysis presented in Table 5 provides a robust assessment of how well the selected predictors explain the variability in the dependent variable. While the model demonstrates a moderate level of explanatory power with a substantial proportion of variance explained, further research could explore additional variables to enhance the model's predictive accuracy and capture additional nuances in the relationship under study. These findings contribute valuable insights into the factors influencing the dependent variable, offering implications for future studies and practical applications in relevant fields.

Table 5: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics		
					R Square Change	F Change	df1
1	.615[a]	.378	.370	4.40499	.378	48.036	4

Source: Field Data (2024)

ANOVA

Table 6 presents the results of an analysis of variance (ANOVA) for a regression model that explores the relationship between several predictors and the Safety of the Boda Boda Operators, serving as the dependent variable. The F statistic, calculated as 48.036, tests the overall significance of the regression model. With a corresponding p-value of .000 (significant at $p < .05$), the F test indicates that the regression model as a whole is highly significant in explaining the variability in the Safety of the Boda Boda Operators. This suggests that the combination of predictors—Knowledge acquisition and understanding and Practical skills advancement jointly influence the safety outcomes observed among boda boda operators.

Table 6: ANOVA

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	1864.18	4	932.092	48.036	.000[b]
	Residual	6170.47	316	19.404		
	Total	8034.66	320			

a. Dependent Variable: Safety of the Boda Boda Operators

b. Predictors: (Constant), Knowledge acquisition and understanding, Practical skills advancement

Source: Field Data (2024)

Coefficients

Table 7 presents the coefficients from a regression model examining predictors related to the Safety of the Boda Boda Operators. The analysis reveals several key insights into the factors influencing safety outcomes within this context. The constant term, representing the intercept of the regression equation, is 17.149, indicating the expected value of safety when all predictor variables are zero. Among the predictor variables, Knowledge acquisition and understanding shows a significant positive impact on safety, with an unstandardized coefficient (B) of 0.329 and a standardized coefficient (Beta) of 0.314. This suggests that for every one-unit increase in knowledge and understanding related to the job, there is an expected increase of approximately 0.329 units in safety, after accounting for other variables in the model.

Practical skills advancement exhibits a notable influence on safety, reflected in its unstandardized coefficient of 0.352 and standardized coefficient of 0.323. This indicates that

enhancements in practical riding skills are associated with improved safety outcomes among operators.

Table 7: Coefficients

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.149	1.447		11.852	.000
	Knowledge acquisition and understanding	.329	.050	.314	6.510	.000
	Practical skills advancement	.352	.056	.323	6.310	.000

Source: Field Data (2024)

Discussions of Findings

Knowledge acquisition and understanding

The current study on boda boda operators' knowledge acquisition and understanding provides a nuanced perspective that aligns with and enriches existing literature on motorcycle rider education and training. Firstly, emphasizing the pivotal role of education in the boda boda industry echoes broader research indicating that formal education and training are foundational in equipping motorcyclists with the necessary skills for safe and efficient operation (Singh & Mattoo, 2020; Mayhew et al., 1998). Participants in the study consistently rated their educational background as crucial for their job performance, with a mean score of 4.0810 and a standard deviation of 1.29167, underscoring their belief in the direct impact of education on their effectiveness and safety practices.

The exploration of participants' awareness of traffic rules (mean score 2.8723, SD 1.65620) reflects a critical area identified for improvement. This finding is significant as it underscores a potential gap in comprehensive training programs that should ideally include robust coverage of regulatory knowledge (Kemei, Sakata, & Nyaboga, 2022). Enhancing understanding and adherence to traffic regulations is pivotal for minimizing risks on the road, aligning with literature that emphasizes the need for continuous education in this domain to enhance overall safety outcomes.

Participants' reported understanding of road signs (mean score 3.4922, SD 1.45154) and their ability to communicate effectively in both English and Kiswahili languages (mean score 3.3551, SD 1.65030) highlight critical competencies necessary for safe navigation and customer interaction. These findings are consistent with broader discussions in the literature on the multifaceted skill set required for proficient motorcycle operation (Elliot et al., 2003). Effective communication and clear understanding of signage contribute significantly to reducing misunderstandings and enhancing overall road safety.

The study's findings on participants' knowledge of motorcycle maintenance and basic repairs (mean score 3.4206, SD 1.66792) underscore their proactive approach to vehicle upkeep, a practice crucial for ensuring operational safety and reliability. Additionally, the strong commitment to staying updated with changes in traffic laws and regulations (mean score 3.7788, SD 1.48881) reflects participants' awareness of the dynamic nature of road regulations and their dedication to complying with current standards (Ivers et al., 2016).

The study also identifies areas where targeted interventions could yield substantial improvements. For instance, enhancing awareness and adherence to traffic rules remains a critical focus area, as indicated by the moderate scores observed. This insight aligns with previous studies highlighting the correlation between comprehensive regulatory knowledge

and reduced accident rates (Collins, 1979; Mullin et al., 2000). Standardizing educational initiatives and intensifying training efforts could mitigate risks associated with varying levels of knowledge and skill among boda boda operators, thereby enhancing overall safety within the industry.

Practical skills advancement on the safety of boda boda operators

The findings from the current study on practical skills advancement among boda boda operators align and provide valuable insights that complement existing literature on motorcycle rider training and safety practices. Firstly, the study's emphasis on the possession of a rider's license (mean score 2.9751, SD 1.75695) underscores a critical issue identified in previous research by Yogo (2018) and Luchidio (2015), which highlighted inadequate formal training among a significant proportion of operators. Yogo's study noted that only 47% of participants had completed formal training, indicating a substantial gap in regulatory compliance and safety knowledge due to insufficient training initiatives.

The study's observation regarding the attendance of annual refresher courses (mean score 2.3053, SD 1.61253) resonates with Luchidio's findings, where a majority of operators lacked formal road safety training, thus hindering their compliance with safety regulations. This consistency underscores the persistent need for continuous skill development and regulatory adherence among boda boda operators to enhance overall safety outcomes.

Participants' self-assessed efficiency and effectiveness on the road (mean score 4.2523, SD 1.17335) and their confidence in handling emergency situations (mean score 3.8536, SD 1.52081) echo the findings of Luchidio, which indicated that certified drivers demonstrated enhanced safety awareness and compliance due to structured training at driving schools. This correlation highlights the importance of confidence and proficiency in practical road skills, which are pivotal for safe and effective operation, as emphasized by Yogo's study on safety compliance among trained riders.

The study also identifies areas for improvement, such as the moderate engagement in defensive driving techniques (mean score 2.6511, SD 1.73828). This finding suggests a potential gap in comprehensive training programs that should include robust coverage of defensive driving skills, as indicated by the broader literature on motorcycle safety (Moller et al., 2020; Chen, Lin, & Chen, 2018). The current study enriches our understanding of practical skills among boda boda operators, its findings underscore both strengths and areas for enhancement identified in previous research. Addressing these identified gaps through targeted training programs and regulatory initiatives could significantly bolster safety practices within the boda boda industry, aligning with global efforts to reduce motorcycle-related accidents and fatalities through effective education and training interventions.

The current study delves deeply into the practical skills advancement of boda boda operators, offering nuanced insights that resonate with and expand upon findings from existing literature on motorcycle rider training and safety practices. Specifically, the study meticulously assessed several dimensions of practical skills among operators, shedding light on critical aspects essential for their safety and operational efficacy. The study's focus on the possession of a rider's license (mean score 2.9751, SD 1.75695) echoes longstanding concerns highlighted by previous research, such as Yogo (2018) and Luchidio (2015), which consistently underscored the significant proportion of operators lacking formal training and legal compliance due to inadequate licensing. This alignment underscores a persistent issue across various geographical contexts regarding the pivotal role of formal training and licensing in ensuring regulatory adherence and safety among motorcycle operators.

The study's observation regarding the attendance of annual refresher courses (mean score 2.3053, SD 1.61253) resonates with Luchidio's findings, emphasizing the ongoing challenge

of sustaining continuous skill development and safety education among boda boda operators. This finding underscores the need for targeted interventions and policy initiatives aimed at promoting regular training updates to enhance operators' competence and regulatory compliance.

Participants' self-assessed efficiency and effectiveness on the road (mean score 4.2523, SD 1.17335) and their confidence in handling emergency situations (mean score 3.8536, SD 1.52081) reflect critical strengths identified in previous literature. For instance, Luchidio's study highlighted that certified riders, who received structured training, exhibited superior safety awareness and compliance, contributing to reduced accident rates and improved road safety outcomes. This alignment underscores the vital role of confidence and proficiency in practical road skills, critical for safe and effective operation within the boda boda sector.

The study also identifies notable areas for improvement, such as the moderate engagement in defensive driving techniques (mean score 2.6511, SD 1.73828). This finding suggests a crucial gap in comprehensive training programs, emphasizing the need for robust coverage of defensive driving skills to mitigate risks associated with unpredictable road conditions and enhance overall safety practices among operators.

Conclusions

The study revealed that boda boda operators generally perceive their educational background as significantly beneficial for their job performance, indicating a strong recognition of the importance of formal education in enhancing their competencies. However, there are areas for improvement, particularly in awareness of traffic rules and proficiency in languages (English and Kiswahili), where operators showed moderate levels of agreement. These findings underscore the need for targeted educational interventions to enhance operators' knowledge in specific areas crucial for their role in the transport industry.

The findings highlighted strengths in self-assessed road efficiency, emergency handling, and customer interactions among boda boda operators. However, there are notable gaps in formal license acquisition, attendance at refresher courses, and consistent practice of defensive driving techniques. Addressing these gaps through structured training programs could significantly improve safety outcomes and enhance the professional capabilities of operators.

Recommendations to the Study

To enhance boda boda operators' knowledge and understanding, it is recommended to implement targeted educational programs focusing on traffic rules, road signs, and language proficiency. Collaborations with educational institutions can integrate road safety education into formal training, ensuring comprehensive coverage of essential topics. Regular assessments should be conducted to monitor operators' grasp of safety regulations, with incentives offered for continuous improvement. By prioritizing ongoing education and incentivizing knowledge acquisition, operators can be better equipped to navigate complex road environments safely and effectively.

Practical skills among boda boda operators can be enhanced through several key strategies. Firstly, the development of mandatory refresher courses focusing on defensive driving techniques, emergency response, and motorcycle maintenance is crucial. These courses should incorporate simulation-based training to simulate real-world scenarios and improve operators' responsiveness. Additionally, providing subsidized training opportunities and integrating customer service training can further elevate operators' practical skills and professionalism. By investing in continuous skills development, the boda boda industry can ensure that operators are equipped to handle diverse challenges on the road while maintaining high standards of service and safety.

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