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## Awareness and compliance on road markings and signs: Insights to enhance safety campaigns

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### Abstract

Due to the increasing number of road-related incidents, it was important to assess the extent to which drivers and commuters understood and complied with road markings and signs. The relationship between residents' awareness of road markings and signs and their compliance in Roxas City was examined. The study aimed to provide data-driven recommendations to improve road safety initiatives and strengthen responsible road behavior among residents. A quantitative cross-sectional research design was implemented, utilizing convenience random sampling. The respondents consisted of 399 drivers and commuters in Roxas City. Data were gathered through a validated survey questionnaire. Descriptive and inferential methods, such as frequency, percentage, mean, Pearson correlation, and regression analysis, were conducted using the Statistical Package for the Social Sciences. The findings revealed that respondents demonstrated high awareness and strong compliance with road markings and signs. Respondents showed familiarity in recognizing, understanding, and applying road markings and signs in daily situations. A marked or substantial relationship between awareness and compliance was also identified, indicating that greater awareness was associated with higher compliance with road safety rules. Regression analysis further confirmed that awareness significantly predicts compliance. The study emphasizes the importance of increasing awareness to improve road users' behavior. It recommended that local government units and concerned agencies enhance road safety campaigns, improve the visibility and maintenance of road markings and signs, and strictly enforce traffic regulations to promote safer roads and reduce accidents.

**Keywords:** Awareness; Compliance; Road Safety; Road Markings and Signs; Roxas City; Safety Campaigns

### 1. Introduction

Road markings and signs are essential components of the road system that guide drivers and commuters, regulate traffic flow, and promote road safety. In the Philippines, drivers and commuters were expected to comply with traffic rules and regulations under Republic Act 4136, also known as the Land Transportation and Traffic Code [56]. Clear and highly visible road markings and signs enable drivers and commuters to make safer decisions and better anticipate upcoming road conditions [13]. Despite road markings, signs, and safety campaigns, road-related incidents continue to increase due to noncompliance, limited enforcement, and driver and commuter awareness. Studies showed that insufficient understanding of road markings and signs contributed to unsafe driving behavior, traffic violations, and accidents, particularly in high-traffic and urban areas [57].

Local Government Units (LGUs) and concerned agencies were expected to strengthen road safety through enforcement, public awareness campaigns, and proper maintenance of road markings and signs. Despite the introduction of road safety policies and programs, a significant number of drivers and commuters continue to disregard traffic regulations, resulting in accidents and heightened public safety risks. In Roxas City, local reports revealed that inadequate road

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markings and signs, as well as noncompliance with road regulations, contributed to several road accidents and fatalities [58] [29]. Existing studies on road safety have mainly focused on accident statistics, traffic violations, and infrastructure conditions, while limited attention has been given to understanding drivers' and commuters' awareness and compliance with road markings and signs in the local context.

This quantitative study examined drivers' and commuters' awareness and compliance with road markings and signs in Roxas City. Unlike studies that primarily focused on accident reports and infrastructure issues, this research highlighted the relationship between awareness and compliance among drivers and commuters. Guided by road safety principles and behavioral perspectives, the study aimed to determine the levels of awareness and compliance among drivers and commuters and to examine whether awareness significantly influences compliance with road markings and signs. The study's findings could offer valuable insights to enhance road safety campaigns, reinforce traffic management, and encourage responsible road behavior in Roxas City.

### **1.1. Statement of the Problem**

Specifically, this study sought to answer the following questions:

- What is the level of awareness of residents on road markings and signs as a whole and in terms of perception, comprehension, and projection?
- What is the extent of compliance of residents with road markings and signs as a whole and in terms of attitude, subjective norms, and perceived behavioral control?
- Is there a significant relationship between the level of awareness of road markings and signs and the extent of compliance of residents?
- Does the level of awareness of road markings and signs act as a predictor of the level of compliance?
- What insights can be drawn from the results of the study towards a successful safety campaign?

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## **2. Materials and Method**

### **2.1. Research Design**

A quantitative cross-sectional research design was used to assess drivers' and commuters' awareness and compliance with road markings and signs in Roxas City. The cross-sectional design was appropriate because it allowed the researchers to collect data from drivers and commuters at a single point in time and examine variables as they naturally occurred without manipulation. The study aimed to assess current levels of awareness and compliance among drivers and commuters and to determine whether a significant relationship exists between them. Through this approach, the study generated data-driven insights that strengthened road safety campaigns, improved traffic enforcement, and promoted responsible road behavior among Roxas City residents.

### **2.2. Context of the Study**

The study was conducted in Roxas City, Capiz, a growing urban center in the Western Visayas region of the Philippines with an estimated population of 179,292 [25]. The city's roads were heavily used by drivers and commuters traveling to schools, workplaces, markets, and residential areas, underscoring the importance of road safety as a public concern. Areas near schools, markets, and construction sites were identified as particularly vulnerable to accidents and to noncompliance with road markings and signs, making them central to this study.

### **2.3. Respondents of the Study**

The study sample comprised of 399 drivers and commuters in Roxas City, selected through convenience random sampling. This non-probability sampling technique was deemed practical and efficient as it enabled the collection of responses from readily available participants within the study period. Eligible participants included licensed drivers and commuters aged 18 to 59 years old who regularly used the roads in Roxas City. Drivers operating without a license and commuters aged 60 years and above were excluded. Most respondents were between 18 and 29 years old, predominantly male, and had college-level education. The sample reflected a balanced representation between drivers and commuters, facilitating the capture of varied perspectives regarding road markings and signs.

## **2.4. Research Instrument**

A structured survey questionnaire served as the primary research instrument. It was developed by the researchers and translated into Hiligaynon to enhance clarity and respondent comprehension. The questionnaire comprised three sections: demographic profile, awareness of road markings and signs, and compliance with road markings and signs. The awareness section was informed by Situation Awareness Theory, emphasizing respondents' recognition, understanding, and interpretation of road markings and signs. The compliance section utilized the Theory of Planned Behavior to analyze the influence of attitudes, subjective norms, and perceived behavioral control on adherence to markings and signs. The instrument underwent expert validation using the Good and Scates criteria and received a validity rating of "very good". A pilot study involving 30 respondents yielded a Cronbach's alpha coefficient of 0.968, indicating excellent internal consistency and reliability.

## **2.5. Data Analysis Procedure**

Data collection utilized both face-to-face survey distribution and Google Forms to offer respondents multiple participation options. Informed consent was obtained before data gathering to ensure participants understood the study's purpose, procedures, and their rights. Completed questionnaires were systematically collected, organized, tabulated and analyzed using the Statistical Package for the Social Sciences. Descriptive statistics, including frequency counts, percentages, and means, described respondents' demographic profiles and determined levels of awareness and compliance. Pearson correlation analysis examined the relationship between awareness and compliance regarding road markings and signs. Responses were measured using a five-point Likert scale, with verbal interpretations ranging from "Fully Not Aware/Compliant" to "Fully Aware/Compliant."

## **2.6. Ethical Standards**

Ethical standards were strictly upheld throughout the study to safeguard participant protection and well-being. Participation remained voluntary, with confidentiality and anonymity consistently maintained. All data were securely stored in accordance with Republic Act No. 10173, the Data Privacy Act of 2012. Participants were fully informed of their right to withdraw from the study at any stage without penalty. The findings were utilized solely for academic purposes and aimed to support the advancement of road safety awareness, policy development, and traffic management initiatives in Roxas City.

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## **3. Results and Discussion**

### **3.1. Level of Awareness of Residents on Road Markings and Signs as a Whole and in terms of Perception, Comprehension and Projection**

Drivers and commuters in Roxas City illustrated the critical role of road markings and signs in daily mobility, as safe travel relied on the ability to notice, interpret, and respond to environmental road cues. Movement across roads, intersections, school zones, markets, and construction areas was guided by these traffic regulations, which served as standardized visual indicators to maintain order and safety. Despite the presence of these road markings and signs, issues such as misinterpretation, failure to notice certain signs, and inconsistent compliance with traffic regulations persisted, highlighting ongoing challenges in driver and commuter road-safety behavior.

In terms of perception, drivers and commuters generally demonstrated the ability to recognize common road markings and signs encountered during travel. This awareness was shaped by continuous exposure to road environments and formal requirements, such as drivers licensing processes [75]. However, recognition was not consistent across all types of road markings and signs, particularly those requiring closer attention or differentiation, such as lane markings. These findings suggested that although drivers and commuters were generally attentive to traffic cues, specific road conditions and variations in signage design may still influenced the effectiveness of recognition and interpretation in real-world situations.

Regarding comprehension, drivers and commuters demonstrated strong ability to understand the meaning and purpose of road markings and signs, and to apply them appropriately in real-life situations. This includes interpreting traffic signals, and pedestrian-related markings that guide safer road conditions. Understanding reflects how knowledge of road markings and signs is integrated into daily behavior, allowing road users to make informed decisions and respond appropriately to different traffic situations. This level of comprehension plays an important role in reducing confusion and supporting safer road practices among drivers and commuters [26].

In terms of projection, drivers and commuters demonstrated the ability to anticipate potential road situations and adjust their behavior accordingly. This included responding proactively to intersections, pedestrian crossings, traffic lights, and other conditions requiring timely decision-making. Such anticipatory behavior suggested that drivers and commuters considered potential outcomes to prevent accidents and promote smoother traffic flow, rather than merely reacting to immediate cues [65]. Nevertheless, differences in attentiveness, driving experience, and other environmental distractions affected the consistency of this anticipatory ability [2].

Overall, the experiences of drivers and commuters indicated a strong awareness of road markings and signs, cultivated through both daily exposure and formal education. This awareness facilitated safer and more responsible road behavior by enabling individuals to perceive traffic regulations, comprehend their meaning, and anticipate road situations. However, inconsistencies in recognition and application highlighted the need for ongoing road safety education, enhanced visibility and clarity of road markings and signs, and sustained enforcement of traffic regulations to ensure that awareness consistently translated into safe practices among all drivers and commuters.

### **3.2. Level of Compliance on Road Markings and Signs of Residents as a Whole and in terms of Attitude, Subjective Norms and Perceived Behavioral Control**

Drivers and commuters in Roxas City exhibited a high level of compliance with road markings and signs, underscoring the critical role of road rules and regulations in maintaining safety and order. This compliance demonstrated that drivers and commuters recognized the significance of adhering to road markings and signs and understood their contribution to accident prevention. The findings indicated that compliance behavior was shaped by personal beliefs about road safety, social expectations, and confidence in the ability to follow road markings and signs across various situations [4]. Although some areas still experienced road violations and incidents, the results suggested that responsible road behavior was generally observed among drivers and commuters.

In terms of attitude, drivers and commuters expressed a highly positive evaluation of compliance with road markings and signs. Respondents generally believed that adherence to road markings and signs was essential for maintaining safety, preventing accidents, and facilitating smoother traffic flow. This perspective suggested that compliance was regarded not only as an obligation imposed by authorities but also as responsible behavior benefiting both individuals and the broader community [19]. The positive attitude observed reflected an understanding that road markings and signs were critical guides in daily travel, and that neglecting them endangered both drivers and commuters. These findings indicated that respondents had internalized the importance of road safety practices, which contributed to their willingness to voluntarily comply with road markings and signs [74].

Regarding subjective norms, the findings indicated that social influence significantly shaped compliance among drivers and commuters. Respondents reported following road markings and signs not only because of personal understanding but also because of the expectations and influence of family, peers, fellow drivers, commuters and broader community [36]. The perception that responsible road behavior was socially expected encouraged greater discipline and caution among drivers and commuters. Furthermore, belief that stricter enforcement by authorities enhanced compliance strengthened the sense of responsibility among drivers and commuters. These results demonstrated that compliance was reinforced by shared community expectations and perception that adherence to traffic regulations was both socially accepted and encouraged.

In terms of perceived behavioral control, drivers and commuters generally expressed confidence in their ability to comply with road markings and signs across diverse road situations. Most drivers and commuters believed they could adhere to road rules despite varying traffic conditions, road environments, and daily challenges [3]. This suggested that drivers and commuters perceived themselves as possessing adequate knowledge, awareness, and self-discipline to act safely and responsibly. However, minor variations in response indicated that external factors such as traffic congestion, road conditions, visibility of road markings and signs, and the consistency of traffic enforcement still influenced the ease of compliance for some individuals in Roxas City. Compliance was strongly shaped by positive attitudes and social influences while also supported by a generally high level of perceived behavioral control. This suggested that responsible road behavior was influenced not only by personal capability but also by the interaction of beliefs, community expectations and environmental conditions [4], emphasizing the need for continuous road safety education, effective enforcement, and improved traffic management systems to sustain consistent compliance among drivers and commuters.

### **3.3. Relationship Between Road Marking and Signs Awareness and the Compliance of Residents in Roxas City**

The relationship between awareness of road markings and signs and the compliance of drivers and commuters in Roxas City showed a meaningful connection between the two variables. The findings indicated that awareness and compliance are significantly related, suggesting that changes in awareness were associated with corresponding changes in compliance behavior among respondents [57].

The results revealed that higher level of awareness was associated with higher levels of compliance with road markings and signs [60]. This implied that drivers and commuters who were more familiar with and had a better understanding of road markings and signs are more likely to follow road rules and regulations. Conversely, lower levels of awareness corresponded to reduced consistency in compliance, indicating that knowledge and understanding played an important role in shaping road behavior [57]. The significant results of the analysis confirmed that awareness and compliance were not independent of each other. Instead, they were interconnected, with awareness serving as an important factor that influenced how drivers and commuters behaved on the road. This suggested that improving awareness may lead to better compliance with road markings and signs, contributing to safer and more responsible road users in Roxas City [60].

Overall, the findings demonstrated that awareness has a direct and positive relationship with compliance. This meant that as drivers and commuters became more aware of road markings and signs, their likelihood of following road regulations also increased. The results highlighted the importance of strengthening awareness as a key approach to improving compliance and promoting road safety behavior among road users [11].

### **3.4. Level of Road Markings and Signs Awareness Acts as Predictors of the Level of Compliance of Residents of Roxas City**

The regression analysis assessed whether selected profile variables significantly predicted the level of awareness and compliance with road markings and signs among drivers and commuters in Roxas City. The findings demonstrated that only specific variables exhibited a significant predictive relationship, while others did not substantially influence the outcomes.

Gender and educational attainment did not demonstrate significant differences in awareness and compliance. These findings indicated that variations in gender and educational level did not meaningfully affect drivers' and commuters' understanding of or adherence to road markings and signs. While these factors contributed to general background characteristics, they were not strong determinants of road safety behavior in this context [72].

In contrast, age emerged as a significant predictor of awareness and compliance. The analysis revealed a negative relationship: as age increased, awareness and compliance decreased. Consequently, younger respondents exhibited higher levels of awareness and compliance than older respondents, establishing age as a key factor in explaining variations in road safety behavior [18].

Similarly, the distinction between drivers and commuters was identified as the strongest predictor among all variables. This factor significantly influenced awareness and compliance, highlighting behavioral differences between these groups. Exposure, experience, and role on the road contributed to how individuals perceived and adhered to road markings and signs, with one group exhibiting higher levels of awareness and compliances than the other.

Overall, the regression analysis demonstrated that awareness and compliance with road markings and signs were significantly influenced by age and by whether an individual was a driver or commuter, whereas gender and educational attainment did not significantly contribute to outcome variation. These results indicated that demographic and experiential factors, rather than general background characteristics, played a more substantial role in shaping road safety behavior among respondents.

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## **4. Conclusion**

The study found that road markings and signs were critical for promoting road safety, traffic discipline, and responsible behavior among drivers and commuters in Roxas City. It emphasized that both awareness and compliance were essential for enabling road users to make safer decisions and respond appropriately to various traffic situations. Awareness was identified as a key factor in responsible road behavior, as it allowed individuals to recognize, understand and apply road markings and signs effectively in real-world contexts.

The study further demonstrated that road safety behavior is shaped not only by knowledge of road markings and signs but also by individual perceptions, comprehension, projection, subjective norms, and perceived behavioral control. Compliance with road regulations increases when drivers and commuters adopt positive attitudes reinforce responsible road behavior.

The study underscored the necessity of ongoing road safety education, reinforcement, and effective implementation of road safety programs. Enhancing the visibility of road markings and signs, strengthening enforcement, and promoting practical, community-based road safety initiatives contributed to maintaining responsible behavior among drivers and commuters.

In summary, the study concluded that increasing the awareness and ensuring consistent compliance with road markings and signs were essential for promoting safer roads, reducing traffic-related risks, and fostering disciplined and responsible drivers and commuters in Roxas City.

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## **Compliance with ethical standards**

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### *Disclosure of conflict of interest*

The authors declare no conflicts of interest regarding the publication of this paper.

### *Statement of ethical approval*

The study adhered to established ethical standards to protect participants' rights and well-being and to maintain research integrity. Participation was voluntary, and informed consent was obtained prior to data collection. The study's purpose, procedures, estimated duration (10-15 minutes), and participants' right to withdraw at any time without penalty were clearly communicated.

The study involved minimal risk, restricted to the time and effort required for questionnaire completion. Participation were not required to answer questions that could cause discomfort and were permitted to skip such items. Confidentiality and anonymity were strictly upheld. Identification codes were used to protect participants' identities, and no personally identifiable information was disclosed in any report, publication, or presentation. All data were securely stored and accessible with Republic Act No. 10173, the Data Privacy Act of 2012, all data were appropriately managed and safeguarded.

The findings were used exclusively for academic purposes and disseminated to relevant academic and professional audiences without disclosing participant's identities. The study sought contribute to enhanced road safety awareness and policy development while maintaining the highest ethical standards throughout the research process.

During manuscript preparation, Microsoft Copilot, ChatGPT, and Grammarly were utilized to gather information and assist with grammar correction. Following the use of these tools, the manuscript underwent thorough review, fact-checking, and editing. All citations and sources were verified. The research team assumed full responsibility for the content of this paper.

### *Statement of informed consent*

Informed consent was obtained from all individual participants included in the study.

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