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Factors Influencing the Dark Glass Usage in Motorcars: A Mini Review

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Abstract: This study reviews the factors influencing the use of dark glass (tinted windows) among car owners in Malaysia as well as several countries. The increasing popularity of tinted glass in Malaysia, primarily for privacy, comfort, and protection against ultraviolet (UV) rays, has raised concerns regarding compliance with Road Transport Department (JPJ) regulations and road safety. The findings on comparison of visible light transmission (VLT) limits for vehicle windows highlights distinctive regulatory approaches worldwide aimed at balancing driver safety and passenger privacy. For instance, in Malaysia, the front windshield must allow at least 70% VLT, and front side windows at least 50%, while no minimum VLT is mandated for rear windows under the Road Transport Rules. Similarly, many European countries as well as United States require front windows to maintain a minimum of 70% VLT, whereas rear windows are permitted darker tints. Overall, front windows commonly require higher VLT to avoid obstructing the driver's view, while rear windows provide greater flexibility for privacy and heat protection. These regulations, often embedded in national transport acts or road safety codes, reflect universal safety priorities and regional adaptation in vehicle tint legislation. The study concludes that enhanced public education, enforcement initiatives, and awareness campaigns are essential to ensure that tinted glass usage aligns with national regulations and promotes safer driving conditions.
Keywords: *Tinted glass, awareness, compliance, road safety, JPJ regulation*.

1. Introduction

Tinted glass, also known as dark glass, refers to vehicle windows that are covered with a special film or colour to reduce the amount of light passing through. The main purposes of tinted glass are to increase privacy, reduce heat inside the vehicle, block harmful ultraviolet (UV) rays, and improve driving comfort. The materials used for tinted glass include dyed polyester film, metalized film, carbon-based film, and nano-ceramic film. Each material provides different levels of heat rejection, UV protection, and visible light transmission (VLT).

In Malaysia, the use of tinted glass is controlled by the Road Transport Department (JPJ). According to the latest JPJ regulations, the visible light transmission (VLT) must be at least 70% for the front windscreen, 50% for the front side windows, while the rear side and rear windows have no limit (JPJ, 2023). In addition, this rule is also stated under Section 5 of the Motor Vehicles (Prohibition of Certain Types of Glass) Rules 1991, made under the Road Transport Act 1987, which prohibits the use of glass or materials that may

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reduce visibility and affect road safety. Drivers who fail to follow this law may be fined or imprisoned.

Although the use of tinted windows is becoming increasingly popular, many users do not understand the allowed darkness limits and the risks that may arise from violating these regulations. This situation has the potential to jeopardize road safety, especially in situations of limited visibility for drivers and traffic authorities. Previous studies have shown that excessive window tinting can significantly reduce driver visibility and delay hazard detection, particularly during night-time driving, thereby increasing the risk of road accidents (Wang et al., 2018). In addition, there are concerns about public awareness regarding the relevant laws, which could result in non-compliance. The lack of information and education about the implications of using tinted windows that do not comply with regulations has the potential to increase the risk of accidents. Therefore, this study aims to identify the issue and provide guidance to raise public awareness.

2. Review Findings

2.1 Regulations on dark tint

Many countries establish more stringent visible light transmission (VLT) limits for front side windows compared to rear windows to prioritize driver visibility and safety. In the European Union, front side windows typically require a minimum VLT of 70%, which equates to no more than 30% tint, whereas rear windows are often subject to more lenient or unspecified limits. Japan enforces a similar 70% VLT minimum for front windows but leaves rear window regulations to national discretion. Malaysia mandates a 50% VLT minimum for front side windows and permits rear windows to be tinted as dark as 5%. In the United States, front window VLT standards usually range from 30% to 35%, while rear windows may be significantly darker, often allowing tints at 20% or below depending on the state regulations.

International frameworks such as the United Nations Economic Commission for Europe (UNECE) do not prescribe specific VLT limits for rear windows, delegating these regulatory decisions to individual countries. The prevalent regulatory pattern reflects a global emphasis on maintaining clear visibility through front windows to enhance driving safety, while permitting increased tint darkness on rear windows for privacy and solar heat reduction. This regulatory differentiation underscores a balanced approach between ensuring driver safety and accommodating passenger comfort and privacy needs, demonstrating adaptations to both safety standards and cultural preferences across countries and regions. Table 1 compared the regulations on tinted glass usage between countries which reflects stricter light transmission requirements on front side windows to ensure driver visibility, with rear windows generally allowing darker tints for privacy and sun protection, often with certifications or local approvals.

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Table 1
Regulations on Tinted Glass Usage in Motor Vehicles by Country

Country	Windscreen VLT Requirement	Front Side Windows VLT	Rear Side/Back Windows VLT	Special Exemptions	Reference
Malaysia	≥70%	≥50%	No limit	Yes (medical/ security /diplomatic)	(Department of Road Transport Malaysia, 2023)
Singapore	≥70%	≥70%	≥25%	Yes (written approval required)	(Land Transport Authority, 2023)
Indonesia	≥70%	≥40%	≥35%	Yes (police/ official vehicles)	(The Jakarta Post, 2022)
Thailand	≥70%	≥50%	≥30–40%	Yes	(Bangkok Post, 2022)
India	≥70%	≥50%	≥50%	Rare (mostly prohibited except official)	(Times of India, 2023; The Hindu, 2022)
Japan	≥70%	≥70%	≥70%	Yes (some categories)	(MLIT Japan, 2023)
South Korea	≥70%	≥70%	≥70%	Yes	(Korean Transport Ministry, 2023)
Australia	Top 10% strip only; rest ≥70%	≥35%	≥20% (varies by state)	Yes (medical exemption)	(CarsGuide, 2023)
United Kingdom	≥75%	≥70%	No limit	Yes (police/ medical/ diplomatic)	(UK Government, 2024)
USA	20%–70% depending on state	20%–70% depending on state	No limit in many states	Yes (medical/security, varies by state)	(NHTSA, 2023)

*VLT- visible light transmission

2.2 Reasons on using dark tint

Table 2 indicates the reason of using dark tint among the car owners. Car owners choose to use dark window tints for several practical and lifestyle-related reasons. Primarily, tinting provides enhanced privacy, preventing outsiders from easily viewing the vehicle's interior, which is particularly valued for security purposes by protecting valuables from potential theft. Additionally, window tinting offers significant protection against ultraviolet (UV) rays, reducing occupants' exposure to harmful solar radiation. This function is especially important in tropical climates such as Malaysia, where intense sunlight can cause

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skin damage and accelerate car interior deterioration. Moreover, tinted windows contribute to reducing solar heat inside the vehicle, resulting in a cooler cabin temperature and diminishing the reliance on air conditioning, thereby improving fuel efficiency and comfort.

Comparatively, Malaysian car owners predominantly prioritize UV protection and heat reduction due to the country's hot and humid climate. Similar motivations are observed across other Asian countries, where extreme sun exposure is common. Conversely, in the United Kingdom, the emphasis on window tinting often balances privacy and aesthetic enhancement, along with potential reductions in glare, given the milder climate. While privacy and security are universal concerns, the degree to which heat protection influences tinting preferences differs geographically, reflecting regional environmental conditions and cultural values. This comparison illustrates how climatic and socio-cultural factors shape car owners' motivations for window tinting across Malaysia, other parts of Asia, and the United Kingdom. In addition to climatic and comfort-related factors, motorists' compliance with window tint regulations is also influenced by their level of legal awareness and perception of enforcement. A study conducted in Malaysia found that drivers with low awareness of vehicle regulations were more likely to install non-compliant modifications, including excessive window tinting (Mohamed et al., 2020). This highlights the role of education and enforcement in shaping responsible vehicle modification behaviour.

Table 2
Comparison on the reason of car owners use dark tints (Asia & worldwide)

Main reason	Typical importance in Southeast Asia (e.g., Malaysia, Singapore)	Typical importance in South Asia (e.g., India)	Typical importance in Middle East / Gulf	Typical importance in Europe (UK, EU)	Typical importance in North America (USA)	Typical importance in East Asia / Japan / Korea / Australia
Heat / thermal comfort	Very high — hot, humid climate; major reason.	High — hot climates in many areas.	Very high — extreme heat; prime reason.	Low–moderate — temperate climate, less priority.	Moderate — depends on region (south vs north).	Moderate — varies; Australia (hot) higher, Japan lower.
UV protection	High — protect skin and interior from sun.	High — important in sunny regions.	Very high — strong sun, big concern.	Moderate — useful but less deciding factor.	Moderate — used but not top reason.	Moderate — valued, especially where sun is strong.
Privacy & security	High — urban areas, thieves concern.	High — privacy and security are	High — privacy is culturally important.	Moderate–high — privacy valued, but laws strict.	High — privacy/style important in many areas.	Moderate — style and privacy both matter.

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		common motives.				
Glare reduction / comfort while driving	High — bright sun / glare common.	Moderate–high.	High — intense sunlight.	Moderate — useful but less crucial.	Moderate — valued for driving comfort.	Moderate — commonly valued.
Aesthetics / style	Moderate — popular for appearance.	High — style influences choice strongly.	High — styling and status important.	High — style often important.	High — fashion and aftermarket culture strong.	High — styling matters (Japan/Korea car culture).
Perceived safety (crime deterrent)	Moderate — mixed views.	Moderate — sometimes cited.	Moderate–high — privacy seen as protection.	Low–moderate.	Moderate — varies by area.	Low–moderate.
Availability & cost of legal films	Influences choice — cheaper illegal films sometimes used.	Varies — enforcement affects availability.	High availability of high-performance films (but cost matters).	Good availability of compliant films.	Wide market; many compliant film options.	Good availability but cost varies.
Regulatory influence (how laws shape choices)	Strong — JPJ rules shape what people buy; awareness moderate.	Strong enforcement drives removal campaigns; confusion exists.	Strong but sometimes relaxed for comfort; varies.	Strong — strict limits encourage compliant products.	Patchy — state-by-state rules shape behavior.	Strong — many countries have clear limits (Japan, Australia states).

Source: *Adapted and synthesized from previous studies and regulatory and automotive reports (JPJ, 2023; NHTSA, 2023; CarsGuide, 2023; WHO, 2016).*

2.3 Enforcement on dark tint

Enforcement patterns related to illegal vehicle window tinting demonstrate significant variability across countries, shaped by distinct regulatory frameworks and public compliance levels (NHTSA, 2023; WHO, 2016). In India, enforcement is characterized by frequent, large-scale crackdowns with thousands of vehicles penalized, reflecting active policing but inconsistent compliance across cities (Times of India, 2023; The Hindu, 2022). Enforcement measures often involve immediate removal of illegal tint films and accompanying awareness campaigns (Times of India, 2023). Singapore exhibits strong and consistent enforcement, with strict VLT limits and regular checks during vehicle

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modification drives, resulting in generally high compliance despite occasional violations (Land Transport Authority, 2023). Malaysia maintains clear national regulations accompanied by public guidance and advocacy efforts; however, compliance remains partial due to limited public awareness and unclear communication of legal limits (Department of Road Transport Malaysia, 2023; Motorist.my, 2022).

In the United Kingdom, enforcement operates through centralized vehicle inspection datasets, with clear regulation on minimum VLT levels, and compliance tends to correlate with regional awareness levels (DVSA, 2023; UK Government, 2024). The United States displays considerable state-to-state variation, with localized enforcement efforts and compliance rates influenced by the strictness of state-specific laws (NHTSA, 2023). Similarly, in Australia, regulations and enforcement are state-based, and while data on tint-specific violations are limited at the national level, compliance depends largely on enforcement intensity within individual states (CarsGuide, 2023). Collectively, these enforcement patterns indicate the critical role of clear regulatory communication, consistent policing, and public education in achieving compliance with tinting laws across diverse jurisdictions (WHO, 2016; NHTSA, 2023).

Table 3
Example of enforcement cases reported by several countries.

Country / area	Recent enforcement / case numbers	Compliance / pattern (qualitative)	Source
India	Large, frequent crackdowns. Examples: Kolkata police reported **7,645 challans** for illegal tints (Jan 2018–Jun 2024); Gurugram police **5,229 vehicle owners penalised** in eight months during a recent drive; numerous city campaigns (Mysuru, Mangaluru) where hundreds were booked and fines collected.	Active enforcement with many drivers found non-compliant; removal of illegal film on spot common. Compliance varies by city; awareness campaigns run alongside crackdowns.	Kolkata / Times of India; Gurugram / Hindustan Times; city crackdowns / Times of India. The Times of India+2Hindustan Times+2
Singapore	Island-wide enforcement operations catch illegal modifications (including overly tinted windows). Example: **141 vehicles** booked in a recent islandwide crackdown.	Strong and regular enforcement; limits are strict (70% VLT front/side) and checks occur during modification drives. Compliance generally high but some breaches found during targeted checks.	Straits Times (LTA enforcement). The Straits Times

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Malaysia	National rules clearly set (JPJ: front 70% / front side 50%); public guidance pages and JPJ campaigns reported but did not find a single central published count of tint-related summonses. Studies and local reporting indicate **moderate public awareness** and periodic JPJ advocacy.	Regulations exist and enforcement occurs (JPJ campaigns), but surveys show many users are unclear about limits → partial non-compliance.	JPJ guidance and local explainers. Motorist.my+1
United Kingdom (Great Britain)	Central enforcement datasets publish vehicle checks & prohibition notices (vehicle enforcement data available publicly), but tint-specific national counts are not routinely summarised in a single tint statistic.	National rules are clear (>75% windscreen for many vehicles). Enforcement occurs as part of vehicle checks; compliance generally better where awareness is higher.	GOV.UK vehicle enforcement data (DVSA). GOV.UK
United States	No single national statistic — **state-by-state** variation is large. Some states report periodic stops/citations for illegal tinting but aggregated national numbers are not centralized.	Compliance varies widely with local laws; where rules are strict, enforcement and citations are more frequent. Owners must check state law.	State summaries / tint guides. World Population Review+1
Australia	Laws are **state-based**; centralised tint statistics are limited. States publish enforcement/fines datasets (e.g., NSW open data on fines) but tint-specific national totals are not easily available.	Enforcement happens at state level; compliance depends on state rules and enforcement intensity.	State government statistics portals / yearly reports. Data NSW+1

3. Conclusion

Vehicle window tinting in Malaysia is regulated primarily through visible light transmission (VLT) standards to ensure driver safety and legal compliance. According to the Road Transport Rules (Motor Vehicles Tinted Glass) 1991, amended in 2019 under Motor Vehicles (Prohibition of Certain Types of Glass) (Amendment) Rules 2016, the front windshield must have a minimum VLT of 70%, while front side windows are required to have a minimum of 50% VLT. There are no restrictions on the VLT of rear side windows and the rear windshield, provided the vehicle has two side mirrors. These regulations aim to maintain clear visibility for drivers while allowing for privacy in less critical viewing areas.

Non-compliance can result in severe penalties, including fines up to RM2,000 or imprisonment for up to six months for a first offence, increasing substantially for repeat violations. Enforcement is supported by the use of specialized equipment to measure VLT levels during roadside checks, accompanied by public awareness campaigns to educate motorists about legal tint limits. Overall, the regulations balance the benefits of window

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tinting—such as reducing heat and glare—with the critical need for unobstructed driver visibility to maintain road safety. In conclusion, while tinted glass offers several practical and aesthetic benefits, compliance with national regulations is essential to maintain road safety, assist law enforcement, and create a responsible driving culture among Malaysian motorists.

4. Implication

The findings of this study have several significant implications for authorities, the automotive industry, and the general public. For the authorities, particularly the Road Transport Department (JPJ) and Royal Malaysia Police (PDRM), the results emphasize the need for continuous awareness campaigns and educational programs to improve public understanding of the legal limits for tinted glass. Regular advocacy and community engagement should be strengthened to ensure that drivers are aware of the safety risks and legal consequences associated with non-compliant tints. Additionally, consistent enforcement and periodic reviews of existing regulations can help maintain road safety while addressing current public needs.

For the automotive and tinting industry, the study highlights the importance of providing affordable, high-quality, and legally compliant tinting products. Workshops and service providers should clearly display JPJ-approved Visible Light Transmission (VLT) limits and educate customers about the safety aspects of different tint levels. By doing so, the industry can play a proactive role in promoting lawful and safe tinting practices among consumers.

For the community and vehicle owners, the implication is the need to prioritize safety and compliance over aesthetics or comfort. Drivers should make informed decisions when installing tinted films and avoid exceeding the legal VLT limits, especially for the front windscreen and front side windows.

Overall, this paper underscores the importance of cooperation between enforcement agencies, industry players, and the public. Such collaboration is essential to strike a balance between comfort, privacy, and road safety, ensuring that the use of tinted glass in Malaysia contributes positively to both individual convenience and collective security.

5. Research Limitation

This study has several limitations that should be acknowledged. Firstly, the review was conducted solely through literature search**,** which means that it dependence on the quality and scope of previously published studies; if the original research is flawed, biased, or incomplete.

Therefore, future research is recommended to adopt a mixed-methods approach, combining both quantitative surveys and qualitative interviews, and to expand the study to a broader geographical scope. This would allow for more accurate, comprehensive, and generalizable findings on the factors influencing tinted glass usage and compliance among Malaysian motorists.

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