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LEGAL RECONSTRUCTION FOR AUTONOMOUS VEHICLE USE IN INDONESIA: CHALLENGES AND SOLUTIONS IN THE AGE OF ARTIFICIAL INTELLIGENCE

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Abstract

This research explores the urgent need for a legal framework governing the use of Autonomous Vehicles (AVs) in Indonesia, focusing on the integration of Artificial Intelligence (AI) technologies in transportation. With traffic accidents accounting for a significant portion of global fatalities, the adoption of AVs powered by AI is seen as a potential solution to reduce human errors and enhance road safety. However, Indonesia's existing traffic laws, primarily focused on conventional vehicles, lack provisions for AVs, creating a legal vacuum. This study compares the legal structures of AVs in the United Kingdom and Indonesia, highlighting the differences in recognition, liability, and regulation. Drawing on the concept of "Law as Integrity" by Ronald Dworkin, this paper argues for the construction of a new legal framework that integrates the evolving needs of society, technology, and legal principles. By applying a multi-disciplinary approach, the research emphasizes the importance of collaborative legal construction, involving government, academia, civil society, and manufacturers, to ensure safe, just, and efficient integration of AVs in Indonesia's road systems. The study concludes with recommendations for regulatory reforms, including the establishment of specialized supervisory agencies and the mapping of AV operational areas.

Keywords: Autonomous Vehicles (AV); Artificial Intelligence (AI); Legal Reconstruction; Traffic Regulations; Road Safety.

A. Introduction

Traffic accidents are one of the most significant contributors to mortality in the world. The World Health Organization notes that traffic accidents account for 1.35 million deaths yearly. The causes of these accidents include high human error and a lack of infrastructure to control transportation on the road (Ahmed et al., 2023). In dealing with these problems, the scientific community has developed and utilized Artificial Intelligence (AI) for Autonomous Vehicles (AV) (Harari, 2024). The use of AI here is expected to minimize human error and increase comfort. The ultimate goal is a fully automated AV independent of human control so that the human hope of creating vehicles and traffic with a high life expectancy can be achieved. In other words, switching to autonomous vehicles will likely save the lives of one million people every year (Harari, 2024).

Nowadays, AI has supplied a wide range of technologies to AVs, such as the use of Light Detection and Evaluation (Lidar) to Advanced Driver Assistance Systems (ADAS), which makes modern vehicles have Full-Self Driving, Navigation System, Adaptive Cruise Control, Lane Departure Warning, Automated Emergency Braking and other advanced features (Bridgelall & Tolliver, 2024). These helpful features are possible because they involve deep learning in reading

and detecting roads, obstacles, and traffic signs and gathering information to make decisions on the road (Albert et al., 2022). The development of these technologies has been responded to positively by the world community, which can be seen from the global AV market, which is worth more than 41 billion US dollars in 2024. This market is expected to continue growing in the following years, reaching a value of almost 115 billion US dollars by 2029 (Placek, 2024).

Indonesia, as one of the world's communities, has also accepted the development of this technology. This can be seen from the presence of various AV supply manufacturers such as Toyota, Wuling, Honda, Hyundai, Morris Garages, and various other manufacturers that continue to experience an increase in sales every year (Romero, 2024). Furthermore, Indonesians, especially those on the island of Java, have a positive perception of and interest in using AVs on the road (Nurliyana et al., 2023). The public has an acceptance of AVs with automation levels 2-5[1] on the road. Although the current AV users in Indonesia are still dominated by levels 1-3, there is great potential for developing AVs with higher levels to operate in Indonesia. In other words, Indonesia has the potential to utilize AVs more comprehensively. This is necessary, given that Indonesia is one of the countries with problems with road accidents, being the highest contributor to traffic accidents in Southeast Asia and the Pacific in 2023, with 832 deaths (Global Road Safety Facility, 2024). However, like a double-edged sword, AV utilization in Indonesia is not free from problems. Various questions still loom over the existence of AVs in Indonesia, especially regarding regulation and accountability for using AVs on the road. This considers AV's capability and decision-making and ethical and moral issues for AVs in the event of an accident or malfunction. Remember that the current hopes for AVs are not without gaps because there are various cases of accidents that have involved AVs, such as the case of Elaine Herzberg[2], who was killed by an AV in Arizona (Smiley, 2023).

The current condition makes traffic law in Indonesia limp after its reality. Indonesian law on traffic is still limited to discussing conventional vehicles (Juliansyah, 2022). Law No. 22/2009 on Road Traffic and Transportation (LLAJ Law) does not recognize the term AI or AV, so this certainly makes it very difficult for Indonesian law to deal with accident cases involving AVs; on the other hand, there is a significant increase in the use and utilization of AVs. This legal vacuum implies a lack of legitimacy and classification of AVs, which is crucial for AV utilization. Furthermore, there is a lack of clarity on liability for vehicles involved in traffic accidents and a lack of standardization and safety for AVs in Indonesia. Therefore, there is legal uncertainty if an AV is involved in an accident, which *mutatis mutandis* can impact legal expediency and justice in Indonesia's traffic context.

Recent studies on Autonomous Vehicles (AVs) cover various regulatory, societal, and technical aspects. Tran and Le (2022) analyze European AV regulations and their applicability to ASEAN countries, identifying key legal gaps. Nurliyana et al. (2023) explore Indonesian's interest in AVs on Java Island, highlighting varying acceptance levels. Black and Murray (2019) focus on AI regulation, emphasizing technical and ethical considerations. Juliansyah (2022) argues that legal certainty for auto-pilot cars can be aligned with existing traffic laws. Van Brummelen et al. (2018) studied AV perception systems, improving localization and mapping for enhanced road navigation.

[1] Society of Automotive Engineers International as a global association focused on the automotive, aerospace, and commercial vehicle industries issued the SAE J3016 standard that standardizes six levels of autonomous vehicles. This standard classifies the capabilities of autonomous vehicles from Level 0 (no automation) to Level 5 (full automation). Levels 1-2 require human control or a driver, Level 3 allows self-driving with supervision from a person in charge, Level 4 enables full autonomy in specific areas, and Level 5 operates fully autonomously in all conditions. This classification is widely used by policymakers and the automotive industry to define autonomous vehicles.

[2] Elaine Herzberg was the first victim of an AV crash in the world. The late Elaine was hit by an Uber semi-autonomous Volvo vehicle driven by Rafaela Vasquez. Rafaela hit Elaine when the vehicle did not realize Elaine was passing by on her bicycle, while Rafaela was watching a television show on her phone and was not focused on the road. Rafaela was sentenced to 5 years in prison for negligence.

In contrast with recent studies above, this research explores the urgency and constructs appropriate legal regulations and policies regarding AV in Indonesia. Constructing a new law is a solution that wants to be offered to answer existing problems by doing backward-looking and forward-looking to the legal reality in Indonesia to create law as integrity. On the one hand, backward-looking is done by looking at the old regulation's background, purpose, and objectives. Meanwhile, the forward-looking process can be interpreted when there is a contemporary interpretation of the law based on narratives or community needs (Rodrigues, 2024). This effort was made solely to sharpen the analysis of the legal construction of the ideal AV in Indonesia. Therefore, the law is constructed in its intersubjective reality to achieve the right policy, follow the development of society, and bring certainty, justice, and legal benefits (Augsberg, 2021). Especially in the context of AV legal construction in Indonesia, to answer questions regarding the recognition, accountability, capability, and application of AVs in Indonesia. After all, AVs are the inevitable future, so the government, academics, and Indonesian society must be prepared, especially when AI meets the road.

B. Method

This socio-legal research based on interdisciplinary analysis aims to provide a comprehensive understanding of the construction of AV law in Indonesia. This research is oriented toward how the law is constructed, interpreted, and internalized to all subjects in the reality of the operation of the law (Creutzfeldt et al., 2020). The construction is carried out by collecting data sorted based on its relevance to the object of discussion and grouped based on themes, which are Law, AI, and AVs.

The collected data comprises interdisciplinary information from legal, political, and technological sources. This data is then interpreted based on legal values, principles, and theories (Mahfud & Djohan, 2024). In the context of this research, the concept of law as integrity is employed to examine the urgency and future landscape of the law of AV in Indonesia. This can be achieved through rigorous data collection and interpretation to establish intersubjective truth, particularly in constructing legal frameworks for AI and AV in Indonesia. Finally, conclusions are drawn and presented.

C. Results and Discussions

1. Legal Construction of Artificial Intelligence Utilization in Autonomous Vehicles Based on Dworkin's Law as Integrity

Ronald Dworkin argues that law is an interpretative judgment that combines legal conventionalism and legal pragmatism, called Law as Integrity (Skuczyński, 2021). In the legal construction of using Artificial Intelligence in Autonomous Vehicles, an in-depth interpretation can be carried out through a backward-looking and forward-looking process. The backward-looking process can be seen as exploring the status quo of the creation and substance of a particular legal construction as a pre-interpretation process (Ibric, 2023). Furthermore, Dworkin also believes that in this backward-looking process, it is necessary to look at the old regulation's background, purpose, and objectives. Meanwhile, the forward-looking process can be interpreted when there is a contemporary interpretation of the law based on narratives or community needs.

Law as Integrity is needed to provide a better picture of legal construction, given that this concept represents the construction of a fusion of horizons of a law. This fusion of horizons can be achieved when there is a merging of several pre-understandings so that a *verstehen* emerges that brings together the horizons of other interpreters (Khasri, 2020). This is influenced by the history surrounding it, including the profound unity of all traditions with current events. Based on this view, it is necessary to examine the existing legal construction or status quo regarding AV in Indonesia so that the right policy can be implemented in response to the existence of AV.

Currently, traffic law in Indonesia, specifically regulated in the LLAJ Law, is formed under a legal regime that is still conventional and heavily influenced by anthropocentrism. The 2009 Law on Traffic and Transportation, for example, was still oriented towards improving traffic safety and managing public transportation in a simple and human-oriented manner, while technology at that time had not progressed as far and as sophisticated as it is now. This contributed to the backwardness of Indonesian traffic law in the following years. However, laws based on anthropocentrism alone can be a challenge for humanity because humans are not alone in building and enforcing laws; other realities must be realized and understood wisely, especially the technology around humanity (Lovasz, 2024).

Further to reality, there is a shift in how the world uses and views technology, including on the road (Harari, 2024). There is a shift in relations that initially only placed technology, such as cars, as tools. However, today, technologies such as AVs have been transformed into an inseparable part of humanity as agents of everyday life. Based on an examination of Don Ihde's philosophy of technology, it is inevitable that today, humanity is experiencing a shift from an embodiment relation that views technology as a tool to a background relation that integrates humans with technology (Sandry, 2018). This is in line with Yuval Noah Harari's (2024) view on AI that today, AI is not a tool but an agent that can think, act, will, and make decisions, including supplying the capabilities of an AV.

In response to the development of AVs, various world communities have built their respective legal constructions, such as in the UK, America, Japan, Singapore, China, and several other European countries (Tran & Le, 2022). This legal construction is solely done to minimize the mistakes that the AV can make as an agent. This is the case of Elaine Herzberg, who was involved in a collision with a Volvo AV in Arizona in 2018. The Baidu Appollo case in 2023 involved a Baidu-owned AV that had a minor accident on the streets of Beijing (Hong et al., 2020). This legal construct was formed solely to address humankind's challenges related to AV technology. Based on this shift in reality, Indonesia's anthropocentric approach and the old traffic law regime are incompatible with today's society's shifting narratives and needs. Today, humanity is highly dependent on technology, and technology such as AVs are agents that improve humanity's level of quality of life. Therefore, it is necessary to reform traffic law in Indonesia by building a new legal construct. A legal construct that responds to AI meeting the road.

Based on the previous description, legal pragmatism is needed to answer the weaknesses of current and latest legal arrangements. Conventional legal arrangements are principles left behind, arrangements left behind with contemporary or international tenets and arrangements, and arrangements that lack integration. This can certainly be answered if the law is placed as an integrity. The concept of law as integrity cannot be separated from the discussion of legal construction[3] (Cueni, 2024). An ideal AV legal construction requires an integrated approach, where rights and obligations are defined by the government and law enforcement and involve collaborative participation from individuals and communities. By combining diverse perspectives, legal integration ensures that AV regulations are inclusive and beneficial for all levels of society.

2. Comparison of Autonomous Vehicle Legal Construction in Indonesia and the United Kingdom

The United Kingdom[4] is one of the fastest and most adaptive parties in constructing legal arrangements regarding AVs. The UK government initiated a legal policy to create Connected and

[3] Dworkin argues that the idea of law as integrity is trying to find, in some coherent set of principles about people's rights and duties, the best constructive interpretation of the political structure and legal doctrine of their community.
[4] The United Kingdom is one of the fastest and most adaptive parties in establishing legal frameworks for AV. This makes the UK the most suitable country to serve as a reference in responding to AV developments. On the other hand, the UK and Indonesia are both archipelagic countries with similar landscapes, consisting of urban and rural areas, as well as a left-hand driving system or left side on the road.

Automated Mobility (CAM) in the United Kingdom (Takacs & Haidegger, 2024). This policy aims to drive efforts to realize security, integration, and safety in driving, especially in AVs, by 2025. CAM aims to reduce congestion and accidents caused by vehicles, and the UK government also considers that CAM is expected to improve safety and efficiency in the logistics sector and can contribute to decarbonization efforts. Connected and Automated Mobility initiates the use of AVs based on several regulations already in place.

There are some of the regulations as a legal construction and introduce various basic principles regarding AI and AVs are: (1) The Automated and Electric Vehicles Act 2018 (AEVA 2018); (2) The Road Traffic Act 1998; (3) The Road Vehicles Regulations 1986; and (4) The Highway Code (Tanenblatt et al., 2023). By reading these regulations, it can be understood that there are many differences with Indonesia's regulations that are still lagging, considering that Indonesia only discusses conventional vehicles and in the Indonesian Traffic Law. Furthermore, there are some differences between UK and Indonesian AV regulations.

Table 1.
Differences between UK and Indonesian AV Regulations

Aspects	United Kingdom	Indonesia
Legal Recognition of AVs	AEVA 2018 legally defines AVs (Levels 1-5)	No legal recognition of AVs in Traffic Law
Liability Insurance	AVs must be insured; strict liability applies	Liability still falls on drivers
Regulatory Oversight	The Center for Connected and Autonomous Vehicles (CCAV) oversees AV policies.	No dedicated AV regulatory body
Operational Areas	Defined AV testing and deployment zones	No official AV operational zones

The Automated and Electric Vehicles Act 2018 recognizes AVs or self-driving vehicles as vehicles that "operate in a mode in which it is not being controlled, and does not need to be monitored by an individual." This shows that AEVA 2018 places fully recognized AVs at levels 1-5. Meanwhile, Indonesia does not recognize AVs within its legal system. There is not a single word that indicates if the current Indonesian legislation recognizes AVs on the road. At best, Indonesia recognizes and regulates electric vehicles as also regulated in AEVA 2018. This is outdated and can lead to legal uncertainty without a standardized response.

Moreover, AEVA 2018 provides various forms of liability based on the fault or accident that occurred. This is also supported by The Highway Code of the United Kingdom, which requires a human being to be prepared to take over the AV (The Highway Code, 2022). By creating AEVA 2018, the UK introduces strict liability for AV-related accidents, ensuring that insurance compensates victims while allowing insurers to seek reimbursement from manufacturers in cases of technical faults or unauthorized modifications by users. The insurer has the right to recover costs from the manufacturer if the accident was due to a system defect. The consequence of this arrangement by the United Kingdom is that there is strict liability for insurance to compensate victims with leeway to regress to the manufacturer if there is a device defect and malfunctions carried out by the driver, such as illegal modifications. Furthermore, the registration, insurance, and industrialization of AVs have been implemented through The Road Traffic Act 1998 and The Road Vehicles Regulations 1986. This is certainly different from the current Indonesian legal scheme, which always emphasizes the driver's liability for an accident. This is a consequence of Indonesian traffic law, which is still conventional, anthropocentric, and outdated. No matter what happens on the road, the driver often must take responsibility in the event of an accident. In fact, given the existence of AVs, the AV may be at fault, so will Indonesia maintain an unjust legal framework for AV drivers? Based on this, the comparison of liability can be reviewed as follows:

Table 2.
Differences between UK and Indonesian Liability on AV Regulations

Aspects	United Kingdom	Indonesia
Who is liable?	The Insurer based on Strict Liability	The Driver
Manufacturer's Role	Can be held liable for systems failure	Not Regulated
Insurance Requirement	AVs must have mandatory insurance	No specific AV insurance policy
Driver's Role	They may be responsible if they fail to take over control of levels 2-3	Always responsible

The legal construction above is also complemented by establishing The Center for Connected and Autonomous Vehicles (CCAV), responsible for studying and considering all forms of policy and legal construction of AI in the UK. CCAV is also accountable for integrated AV research and development with various stakeholders. This aims to realize a technologically advanced and specialized CAM that avoids possible accidents. Although advanced construction is still in the process of becoming, the United Kingdom is currently at the forefront of developing the legal construction of AVs. CCAV is a specialized government body under the UK's Department for Transport and Department for Business and Trade. This body has key functions in policy development, research Innovation, and Regulatory Oversight of AV laws . This government body also works with AI developers, insurers, and transportation companies to create a strong relationship, especially in testing and maintaining the deployment zones for the AV.

On the other hand, Indonesia doesn't have any specific regulatory body focused on AVs. Current Indonesian law still detects AI falls under general transportation. This fact is a challenge for many institutions like the Ministry of Transportation, the Ministry of Industry, the Ministry of Communication & Digital, and the Indonesian national police. This institution must prepare a new body to respond to the existence of AV. Furthermore, the presence of this body makes it easier for the UK to map out areas where AVs are allowed to travel or AV-only areas. This is the case with some special areas in Milton Keynes, London, and Birmingham. Similar regions are also being applied in other countries, such as Arizona in America and Tokyo and Fukuoka in Japan. Once again, this should be a consideration for the Indonesian government to do the same. Indonesia currently does not have a special area, let alone a roadmap, for AVs to run safely; this is also considered and thought of solely to present policies and technology that are fair for all.

Such legal constructions owned by the UK are based on the five main principles of utilizing AI and AV. Basic principles such as Beneficence, Autonomy, Non-maleficence, Justice, and Explicability can be clearly illustrated in several legal constructions (Floridi, 2023). This can be shown by differentiated liability, whether financed by insurance, manufacturer's liability, or driver's liability; a person in charge is currently required to operate an AV to supervise and replace it in case of a malfunction. In addition, it can be found in other policies of the UK government, such as road mapping and the establishment of regulatory bodies. This is done solely to ensure that AI cannot hurt and harm humans. However, The UK's regulatory advancements in AVs provide a valuable reference for Indonesia. By addressing legal gaps and adopting a proactive regulatory approach, Indonesia can enhance its legal preparedness for the future of autonomous transportation. Clear AV legislation will facilitate innovation, attract investment, and ensure road safety. Establishing a regulatory body similar to the UK's CCAV could further strengthen AV governance in Indonesia. Such a construction should be a stepping stone, especially for Indonesia, in constructing the law of AI utilization in AVs in various legal constructions in each legal system by involving various horizons of stakeholder understanding.

3. Legal Policy and Liability of Artificial Intelligence Utilization in Autonomous Vehicles in Indonesia

Indonesia's legal framework for AVs lags behind the UK, but its unique sociological and geographical conditions require a tailored approach. While AV manufacturing and policies must account for these differences, Indonesia should still establish a legal foundation. Key principles from the UK, such as Beneficence (ensuring AVs benefit humanity), Non-Maleficence (ensuring liability in case of harm), Autonomy (allowing human decision-making in AV use), and Justice (ensuring AVs are accessible to all), can guide this framework. Legal policies must be adapted to Indonesia's context while aligning with these fundamental principles. The Indonesian government must underline the principle of justice that AVs should not be aimed at specific groups but all people without exception. Based on these applicable principles, some legal policies can be applied more technically, considering Indonesian society's geographical and sociological conditions that are not the same as the vehicle from which the AV manufacturer originates.

a. Classification of SAE International Autonomous Vehicle Levels in Indonesia

The first policy that can be done based on legal construction is to classify the AVs Level in Indonesia by adopting SAE International Leveling as the basis for determining and registering AVs in Indonesia. Society of Automotive Engineers International (SAE International) categorizes AI into six levels or stages through SAE J3016 Recommended Practice: Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles. The six levels of AV are: (1) Level 0, which is without automation; (2) Level 1, there is essential assistance such as lane-keeping assist, but the driver is still in control; (3) Level 2, partial automation that allows the vehicle to control the steering wheel and speed but the driver must be prepared to be in-charge; (4) Level 3, Conditional Automation, which allows the vehicle to run on its own in certain conditions or locations (highways/regulated areas such as Phoenix in America); (5) Level 4, a high level of automation with no human as the controller in certain terrains; and (6) Level 5, which runs in full automation in any condition, without a driver at all (Chen et al., 2023). SAE International says AV development has reached Levels 3 and 4. These stages can evolve and are on their way to Level 5. However, at levels 2, 3, and 4, the attention of the Indonesian people must be directed critically to AI and AV. This is because at levels 2, 3, and 4, there is the potential for negligence from human control over the operation of these vehicles, as happened in the Elaine Herzberg case.

This classification is based on the fundamental principles described above. This classification is necessary to map the safety indicators of AV use on the road. This also makes it easier for the public to accept, weigh, and choose the type of AV they want. This classification is also necessary when rolling between drivers and AI-driven AVs. This classification is required for drivers operating AV from level 1 to level 3 solely to improve the ability of the Person to charge and minimize accidents. This needs to be done because AVs at these levels have the potential to fail and still have ignorance in accelerating their programs (Viale, 2023). Therefore, this approach is expected to dissect and classify each AV level's risks. In addition, with this approach, the government can categorize AV ownership registrations. It can map which AVs should be covered by insurance and which ones the liability burden is given to the driver.

b. Mapping of Operating Areas and Compilation of *Autonomous Vehicles* Mitigation for *Autonomous Vehicles* in Indonesia Measures

The government, society, and academics need to make further considerations by providing an overview of the mapping of AV operating areas in Indonesia. Currently, AVs in Indonesia are dominated by levels 2 & 3. However, level 4 is possible, as done by America in Arizona,

Great Britain in Milton Keynes and Birmingham, or Japan in Tokyo and Fukuoka. It requires unique terrain at certain levels, which differs between the manufacturing area and the terrain in Indonesia. This can be accommodated by mapping special areas that AVs may pass through freeways, such as the Highway Code in the United Kingdom, to main roads in Provinces and Districts / Cities. This is possible due to the lack of obstacles that may be present and interfere with AI systems that need adjustments and developments strictly following their environment. This mapping is necessary as not all roads or infrastructure in Indonesia are compatible with DeepLearning AI systems in developing countries. For example, in developing AI in AVs in the United Kingdom, it is prepared to recognize and understand the terrain and environment there. The AV's understanding of its environment, which recognizes the streets of Manchester, will undoubtedly be different when faced with the narrower and densely populated streets of Tembalang or, of course, very different from the North Coast crossroads full of potholes and freight trucks. Therefore, to minimize accidents and system failures in AV, it is necessary to map the operating areas for AVs while continuing to develop Deep Learning technologies for AVs in Indonesia.

Third, in building this legal construct, strict, careful, and democratic consideration of agreed mitigation measures is required. Mitigation measures to provide security for humans need to be carried out carefully. One effort that can be made is to conduct registration and supervision in the form of feasibility tests for AV designers in Indonesia by the government and non-government organizations. This registration can be done by adopting The UK's Automated and Electric Vehicles Act 2018. This is also similar to the registration of information technology carried out at the Ministry of Communication and Digital through the Electronic System Operator (PSE) by the Ministry. Therefore, it can create integrated monitoring and mitigation measures from the government and the public to represent the principle of transparency to increase awareness and security, whether for the designer, the government, or the public.

c. Establishment of a Supervisory Agency at the Ministry of Transportation regarding Autonomous Vehicles

The establishment of this supervisory institution is expected to be able to carry out tasks in terms of the mitigation process and supervision of AV. In placing the principles of justice and non-discrimination, this institution can be formed by involving all Indonesian people, including even the most minor elements. This is solely done to maintain the cohesiveness and fairness inherent in the supervisory function of AV. Indonesia can adopt the establishment of The Center for Connected and Autonomous Vehicles (CCAV), which is entirely in charge of studying and considering all forms of policy and legal construction of AI in the United Kingdom. CCAV is also responsible for integrated AV research and development with various stakeholders (Tanenblatt et al., 2023). CCAV in Indonesia can be attached to the Ministry of Transportation and work with the Indonesian National Police. CCAV Indonesia can thus also be decisive in studies and determining the direction of AV policy in Indonesia in an open-ended manner with various stakeholders.

d. Autonomous Vehicle Liability in the Context of Road Traffic and Transportation in Indonesia

This accountability can be adjusted to the agreed leveling of each AV. At levels 1-3, which require a person in charge, it is possible to have tiered liability from the manufacturer, operator, and insurer to the government. This highly depends on the investigation into whether the AI, operator, insurer, or government failed to maintain public safety and security (Othman, 2021).The liability issue should be explored further and returned to all parties for agreement.

At levels 1-2, the government can issue tiered liability, although it is prioritized to the driver as this level still requires the driver to take the wheel. However, it becomes more complex when looking at level 3, where liability needs to be emphasized for the producer, the insurer, and the driver. This can again be done by providing strict liability-based insurance to compensate victims with the leeway to regress to the manufacturer.

However, there needs to be a sharper consideration in constructing this law by analyzing liability at levels 4-5. This is especially true at levels 4-5, which allows AVs to run without human control, so their decisions can become moral and ethical issues such as the Trolley Problem. Level 4 conditions can be equated with level 3 because even though they are fully automated, AVs at this level are only legal in certain areas, such as Waymo Robotaxi in Phoenix, USA, or Hyundai Roboride in Seoul (Olayode et al., 2023). Therefore, liability can be assigned to the manufacturer or full insurance if a conclusively proven malfunction exists.

Finally, the common challenge for humanity and Indonesia in constructing this law is to initiate responsibility at level 5 when this vehicle has touched Indonesian asphalt. This is due to its ability to be fully automated in any condition, which causes a significant moral and ethical challenge: who is responsible if an incident occurs? Given this level, AVs have the consciousness to make decisions without borders. It is interesting to connect this ability of AVs to Harari's view of AI as an agent. This will open up great potential for the world community, especially Indonesia, to place this level 5 AV as a legal subject. This fact indeed refutes Juliansyah's view that AVs or autopilot cars in Indonesia are currently liable under the *a quo* law (Juliansyah, 2022). This is certainly considering that the *a quo* law has a form of liability and regime significantly inversely proportional to the current reality that AVs are agents, not just tools.

This possibility can be achieved with Bruno Latour's Actor Network Theory. Latour views reality as a network between actants that influence each other, so all subject-objects between humans and their environment are equal. This interaction creates a network whose actors have a back-and-forth relationship. An example of this relationship is the attachment of legal subjects to the Ganges River to the Indigenous Forests and Rivers of the Maori people in New Zealand (Lovasz, 2024). Based on this understanding, the AV, which can decide, should undoubtedly be an actant whose position is equal to humans as a subject. However, positioning AVs as legal subjects and/or the attachment of other responsibilities here requires agreement between parties because this is a consequence of law as an intersubjective reality (Harari, 2024).

4. Integrity as a Basis for Legal Construction of Artificial Intelligence Utilization in Autonomous Vehicles in Indonesia

Constructing the law in Indonesia, especially regarding the involvement of AI and AV in Indonesia, should not be one party's task. Instead, this process must be the work of many parties, through agreement after agreement. The concept of integration as a basis for legal construction can be the right solution so that legal construction can run appropriately. This shows that various horizons of thought must be brought together and exchanged to fuse and produce the correct result, especially in exploring and equalizing the values and goals of multiple parties. This AV should not become an interest and a tool for political business transactions that are incapacitated and prone to alienation for those who are marginalized. This is in line with Mhairi Aitken, who stated that the determination of AI policy must uphold the principles of inclusiveness, including building the highest possible role of the affected community, including children (Aitken, 2023).

In reality, each party has its interests, from business-oriented manufacturers to the government, that must be enlightened to uphold the banner of the Constitution. Of course, if AI and AV are utilized unilaterally, there is a high possibility of bias in these AI systems. This certainly can present discrimination, surveillance, and other legal problems without strict supervision in the legal construction (Hu, 2024). It should be noted that public involvement and

the role of government should not be separated in dealing with AI and AV. This aligns with contemporary law and technology experts such as Peter Hershock (2020), who show that bottom-up construction is the most appropriate answer to technological problems.

The legal construction of AI and AV in Indonesia requires integration among key stakeholders: government, civil society, academics, manufacturers, and the private sector (Tjahja et al., 2022). The government, represented by the Ministry of Communication and Digital, the Police Traffic Unit, and the Ministry of Transportation, plays a regulatory role. Civil society consists of the general public affected by AI and AV adoption. Academics contribute specialized expertise, including AI and AV development. These four parties must actively shape legal frameworks for AI and AV in Indonesia's traffic and road systems. The government, including the Ministry of Communications and Digital and the Ministry of Transportation, cannot unilaterally shape AI and AV regulations through a Government-to-Business (G2B) approach alone. A balanced framework requires active involvement from academics, civil society, and sub-communities, including children and drivers. This inclusivity can be achieved through equal dialogue and open Focus Group Discussions (FGDs), ensuring democratic decision-making. Once a consensus is reached, legal frameworks can be concretized by amending the LLAJ Law and its derivative regulations, addressing existing legal gaps in AI and AV governance. Finally, contemplating AI and AV is not merely about technology as a tool for humans but rather about uncovering realities beyond human experience.

D. Conclusion

Legal construction on the utilization of AI in AVs can be done through several things, namely: Consensus building on the basic principles of Autonomous Vehicles in Indonesia; Application of comparative legal construction of Artificial Intelligence on Autonomous Vehicles in other countries; Formation of Artificial Intelligence Utilization Policies on AVs in Indonesia through several stages, namely: (1) Classification of AVs in Indonesia through a Leveling approach *a la* SAE International; (2) Mapping of Operating Areas for Autonomous Vehicles in Indonesia; (3) Compilation of AVs Mitigation Measures; (4) Establishment of Supervisory Institutions at the Ministry of Transportation regarding AVs; (5) Formulation of agreements regarding AV Liability in Indonesia; and Constructing legal arrangements based on integration. The government should explore dialectical studies and discussions with academics, civil society, and AI and AV manufacturers in Indonesia in an egalitarian and continuous manner. The government's seriousness is needed in an integrated manner with other stakeholders. It should immediately build consensus and joint legal construction regarding AI and AV, including revising Law Number 22 of 2009 concerning Road Traffic and Transportation.

REFERENCES

Ahmed, S. K., Mohammed, M. G., Abdulqadir, S. O., El-Kader, R. G. A., El-Shall, N. A., Chandran, D., Rehman, M. E. U., & Dhama, K. (2023). Road Traffic Accidental Injuries and Deaths: A Neglected Global Health Issue. *Health Science Reports*, *6*(5), 1–6. https://doi.org/10.1002/hsr2.1240

Aitken, M. (2023). AI , Children's Rights, & Wellbeing : Transnational Frameworks. *The Alan Turing Institute*, *1*(November), 1.

Augsberg, I. (2021). Realidades jurídicas em que vivemos: Novo realismo jurídico e a necessidade de uma epistemologia jurídica. *Revista de Direito*, *13*, 1–26. https://doi.org/10.32361/2021130111700

Black, J., & Murray, A. (2019). Regulating AI and machine learning: setting the regulatory agenda

(complementar). *European Journal of Law and Technology*, *10*(3), 1–17.

Bridgelall, R., & Tolliver, D. (2024). Deciphering Autonomous Vehicle Regulations with Machine Learning. *Applied Sciences (Switzerland)*, *14*(4). https://doi.org/10.3390/app14041396

Chen, S., Zong, S., Chen, T., Huang, Z., Chen, Y., & Labi, S. (2023). A Taxonomy for Autonomous Vehicles Considering Ambient Road Infrastructure. *Sustainability (Switzerland)*, *15*(14). https://doi.org/10.3390/su151411258

Creutzfeldt, N., Mason, M., & Mc Connachie, K. (2020). Routledge Handbook of Socio-Legal Theory and Methods. In *Routledge*. Routledge. https://doi.org/10.4324/9780429952814-1

Cueni, D. (2024). Constructing liberty and equality–political, not juridical. *Jurisprudence*, *0*(0), 1–20. https://doi.org/10.1080/20403313.2023.2296816

The Highway Code, United Kingdom Government (2022).

Floridi, L. (2023). *Ethics, Governance, and Policies in Artificial Intelligence*. Springer Cham. https://doi.org/https://doi.org/10.1007/978-3-030-81907-1

Global Road Safety Facility. (2024). *Indonesia's Road Safety Country Profile*.

Harari, Y. N. (2024). *Nexus: A Brief History of Information Networks from the Stone Age to AI*. Penguin Random House.

Hershock, P. D. (2020). Humane Artificial Intelligence: Inequality, Social Cohesion and the Post Pandemic Acceleration of Intelligent Technology. *Humane Artificial Intelligence: Working Paper Series*, *1*(1).

Hong, D. K., Kloosterman, J., Jin, Y., Cao, Y., Chen, Q. A., Mahlke, S., & Mao, Z. M. (2020). AVGuardian: Detecting and Mitigating Publish-Subscribe Overprivilege for Autonomous Vehicle Systems. *Proceedings - 5th IEEE European Symposium on Security and Privacy, Euro S and P 2020*, 445–459. https://doi.org/10.1109/EuroSP48549.2020.00035

Hu, M. (2024). Critical Data Theory. *William & Mary Law Review*, *839*(09).

Ibric, S. (2023). Ronald Dworkin: Seeking Truth and Justice through Responsibility. *Laws*, *12*(3). https://doi.org/10.3390/laws12030041

Juliansyah, F. M. (2022). Kepastian Hukum Terhadap Mobil Berteknologi Auto Pilot Ditinjau Dari Perspektif Hukum Lalu Lintas Jalan Di Indonesia. *Bureaucracy Journal : Indonesia Journal of Law and Social-Political Governance*, *2*(2), 794–805. https://doi.org/10.53363/bureau.v2i2.108

Khasri, M. R. K. (2020). Hermeneutic Circle in Digital Literation and its Relevance as an Antidote to Hoax. *Informasi*, *49*(2), 113–124. https://doi.org/10.21831/informasi.v49i2.27981

Lovasz, A. (2024). Bruno Latour, Graham Harman, and Nonmodernism. *Journal of Posthuman Studies*, *8*(1), 112–132. https://doi.org/10.5325/jpoststud.8.1.0112

Mahfud, M. A., & Djohan, N. H. (2024). The Expansion of Investor Access to Cultivation Rights: A Socio-Legal Analysis on Agrarian Injustice in Indonesia. *Al-Risalah: Forum Kajian Hukum dan Sosial Kemasyarakatan*, *24*(2), 55–67. https://doi.org/10.30631/alrisalah.v24i2.1500

Nurliyana, C., Lestari, Y. D., Prasetio, E. A., & Belgiawan, P. F. (2023). Exploring drivers' interest in different levels of autonomous vehicles: Insights from Java Island, Indonesia. *Transportation Research Interdisciplinary Perspectives*, *19*(May 2022), 100820.

https://doi.org/10.1016/j.trip.2023.100820

Olayode, I. O., Du, B., Severino, A., Campisi, T., & Alex, F. J. (2023). Systematic literature review on the applications, impacts, and public perceptions of autonomous vehicles in road transportation system. *Journal of Traffic and Transportation Engineering (English Edition)*, *10*(6), 1037–1060. https://doi.org/10.1016/j.jtte.2023.07.006

Othman, K. (2021). Public Acceptance and Perception of Autonomous Vehicles: a Comprehensive Review. In *AI and Ethics* (Vol. 1, Nomor 3). Springer International Publishing. https://doi.org/10.1007/s43681-021-00041-8

Placek, M. (2024). *Size of the global autonomous car market in 2024, with a forecast through 2029*. www.statista.com. https://www.statista.com/statistics/428692/projected-size-of-global-autonomous-vehicle-market-by-vehicle-type/

Romero, L. (2024). *Number of vehicle sales in Indonesia in 2023, by brand*. www.statista.com. https://www.statista.com/statistics/981088/indonesia-new-vehicle-sale/

Sandry, E. (2018). Automation and human relations with the private vehicle: from automobiles to autonomous cars. *Media International Australia*, *166*(1), 11–19. https://doi.org/10.1177/1329878X17737644

Skuczyński, P. (2021). Judicial integrity in adjudication and behaviour. *Krytyka Prawa*, *13*(3), 64–80. https://doi.org/10.7206/KP.2080-1084.472

Smiley, L. (2023). *The Legal Saga of Uber's Fatal Self-Driving Car Crash Is Over*. Wired. https://www.wired.com/story/ubers-fatal-self-driving-car-crash-saga-over-operator-avoids-prison/

Takacs, A., & Haidegger, T. (2024). A Method for Mapping V2X Communication Requirements to Highly Automated and Autonomous Vehicle Functions. *Future Internet*, *16*(4), 1–20. https://doi.org/10.3390/fi16040108

Tanenblatt, E., Malterer, M., & Stockburger, P. (2023). *Global Guide to Autonomous Vehicles 2023*. Dentons.

Tjahja, N., Meyer, T., & Shahin, J. (2022). Who do you think you are? Individual stakeholder identification and mobility at the Internet Governance Forum. *Telecommunications Policy*, *46*(10), 102410. https://doi.org/10.1016/j.telpol.2022.102410

Tran, D. V., & Le, C. T. Q. (2022). Developing a Regulatory Framework for Autonomous Vehicles: A Proximal Analysis of European Approach and Its Application to ASEAN Countries. *TalTech Journal of European Studies*, *12*(2), 165–188. https://doi.org/10.2478/bjes-2022-0016

Val Rodrigues, G. C. (2024). Human Rights, Interpretivism, and the Semantic Sting. *Canadian Journal of Law and Jurisprudence*, *37*(1), 1–29. https://doi.org/10.1017/cjlj.2023.10

Van Brummelen, J., O'Brien, M., Gruyer, D., & Najjaran, H. (2018). Autonomous vehicle perception: The technology of today and tomorrow. *Transportation Research Part C: Emerging Technologies*, *89*(January), 384–406. https://doi.org/10.1016/j.trc.2018.02.012

Viale, R. (2023). Introduction: Artificial Intelligence Should Meet Natural Stupidity. But it cannot! *Artificial Intelligence and Financial Behaviour*, *1*(1), 1–28. https://doi.org/10.4337/9781803923154.00006