LIABILITY ARISING FROM AUTONOMOUS VEHICLES

BY

SOMCHAI CHAMPATHONG

A THESIS SUBMITTED IN PARTIAL FULFILLMENT OF
THE REQUIREMENTS FOR THE DEGREE OF
MASTER OF LAWS IN BUSINESS LAWS (ENGLISH PROGRAM)
FACULTY OF LAW
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ENTITLED

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was approved as partial fulfillment of the requirements for
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ABSTRACT

The technology of autonomous vehicles has undergone rapid development in recent times, surpassing the pace at which traditional automobile liability laws have been able to keep up. It is essential to thoroughly examine the existing liability laws, particularly within the Civil and Commercial Code of Thailand, to determine their compatibility with the concept of strict liability in the context of fully autonomous vehicles. Additionally, an assessment of other relevant laws, such as those about The Product Liability Act B.E. 2551, is necessary. By undertaking these studies, a comprehensive understanding of the legal framework can be attained to address the emerging challenges of autonomous vehicles.

The researcher has conducted a study and made a comparison with the laws of Estonia. This choice was made due to Estonia's notable progress in transforming itself into a developed country within a relatively short timeframe. Estonia is renowned for being a fully digital country with a supportive environment for digital advancements, including its legal framework.

Estonia's legal system has been crucial in fostering its digital development. The country has implemented laws and regulations facilitating digital innovation, e-governance, and emerging technologies. By examining Estonia's legal framework, valuable insights can be gained regarding the legal measures necessary for developing a digital country.

It is worth noting that Estonia's experience in creating a conducive legal environment for digitalization may offer valuable lessons and inspiration for other countries, including Thailand. By studying Estonia's approach, Thailand can potentially identify best practices and adapt them to its unique context, helping to shape a legal framework that supports digital transformation and innovation.

Based on the study, the researcher observed that Thailand's existing tort laws can still apply to cases involving fully autonomous vehicles. However, there is a need for further clarification in the text to ensure precise and unambiguous interpretation. Regarding the product liability law concerning unsafe products, the researcher suggests including the term "computer software" in the text to enhance clarity and mitigate potential complexities in interpretation.

Explicitly mentioning "computer software" can help establish a clearer understanding of the liability framework concerning fully autonomous vehicle technology. This addition can provide specific guidance and alleviate any potential confusion regarding the responsibility attributed to software components in autonomous vehicles.

The proposed revisions aim to enhance the legal framework in Thailand, aligning it more effectively with the unique characteristics and challenges associated with fully autonomous vehicle technology.

Keywords: Autonomous Vehicles (AVs), Driverless Vehicle, Connected Vehicle, Strict Liability, Product Liability, Estonian Law, Computer Software, Embedded system

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Somchai Champathong

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LIST OF ABBREVIATIONS

Symbols/Abbreviations	Terms
GPS	Global Positioning System
LIDAR	Light Detection and Ranging
LOA	Law of Obligations Act
RADAR	Radio Detection and Ranging
SAE	Society of Automotive Engineers

CHAPTER 1
INTRODUCTION

1.1 Background and problem

Thailand has embraced the utilization of autonomous vehicles, including level 1 autonomous vehicles (Driver Assistance), which users are becoming increasingly familiar with. As vehicle technology advanced, a wider range of autonomous vehicles with varying levels of autonomy entered the market. Consequently, this development raises the critical question of whether the current liability laws adequately address the highest level of driverless vehicles. In light of this concern, the researcher conducted a comprehensive study on driverless vehicles at the highest level (level 5), focusing on the following issues:

1. Legal Framework: This study examines the existing legal framework in Thailand, aiming to identify any potential gaps or deficiencies that may arise when addressing liability and responsibility issues in relation to level 5 autonomous vehicles.

2. Liability and Accountability: The thesis explores the complex issue of liability in cases involving accidents or incidents with fully autonomous vehicles or connected vehicles. Special attention is given to the allocation of responsibility among manufacturers, and software developers in the event of collisions or malfunctions.

3. Regulatory Challenges: This research investigates the regulatory challenges associated with the deployment of level 5 autonomous vehicles in Thailand. It explores the necessity for specific regulations or amendments to existing laws to accommodate the unique features and requirements of these vehicles.

In a fully autonomous vehicle, the individual inside the vehicle transitions from a driver to a passenger. In an accident, the passenger may become the victim and have the right to initiate legal proceedings accordingly. This research examines the liability of both self-driving vehicle owners and manufacturers.

1.1.1 Liability of fully autonomous vehicles owner or possessor

When a driverless vehicle is in operation without a human driver, according to Section 437 of the Thai Civil and Commercial Code, the liability for any incidents or accidents will typically be attributed to the owner of the vehicle. The question of whether it is fair for the liability to fall solely on the vehicle's owner, who may not have been present at the time of the accident, raises important considerations.

1.1.2 Liability of autonomous vehicles manufacturers

If an autonomous vehicle is defective, the victim may have the right to sue the manufacturer. The crucial point to consider is that autonomous vehicles consist of components sourced from various manufacturers, particularly computer programs utilized to operate these vehicles.

1.2 Hypothesis

Autonomous vehicles are modern technologies. However, in the event of an accident, the liability laws under the Thai Civil and Commercial Code may not be adequate to address the complexities associated with such advanced technology. Therefore, the researcher proposes implementing liability laws for unsafe products to cover autonomous vehicles in the future effectively.

1.3 Objectives

This thesis aims to examine the liability of self-driving vehicles or autonomous vehicles, taking into account the following points:

1.3.1 Investigating the concept of using self-driving vehicles in Thailand and analyzing the legal perspective regarding such vehicles.

1.3.2 Conducting a study of tort law and product liability law of self-driving vehicles/autonomous vehicles.

1.3.3 Examining the concept of applying tort law and product liability to self-driving vehicles in foreign countries through a comparative analysis.

1.3.4 Exploring the concept of using self-driving vehicles in Estonia and examining the perspective on such vehicles within the legal framework.

1.4 Methodology

This thesis focuses on tort law issues pertaining to fully autonomous vehicles (AVs) or fully self-driving vehicles. The research methodology employed for this study involved documentary research, which included document retrieval and data analysis both within Thailand and internationally. The specific research activities are outlined as follows:

1.4.1 Document retrieval related to tort law in autonomous vehicles

This involved searching and retrieving documents that specifically addressed tort law and product liability law considerations in the context of fully autonomous vehicles. The search encompassed relevant materials from Thailand as well as international sources, with a particular emphasis on findings from Estonia.

1.4.2 Feasibility study and analysis

In this phase, a feasibility study was conducted, analyzing the previously gathered documents to better understand the management of liability in autonomous vehicles in the event of crashes or accidents. This analysis aimed to identify key insights and potential strategies for effectively handling liability issues in the fully autonomous vehicle domain.

1.4.3 Literature review on self-driving vehicles in Thailand and abroad

A comprehensive review of existing literature on self-driving vehicles, both within Thailand and abroad, was undertaken. This review served as a foundation for proposing appropriate management approaches for fully autonomous vehicles in the Thai context.

The primary objective of this thesis is to examine and address the tort law and product liability law implications surrounding fully autonomous vehicles. By conducting a thorough analysis of relevant documents and literature, the study aims to contribute to the development of suitable management strategies for fully autonomous vehicles in Thailand, taking into account liability considerations.

1.5 Expected outcomes

1.5.1 Raising awareness of the legislation concerning fully autonomous vehicles in contemporary foreign jurisdictions is important for the understanding of the legal landscape surrounding autonomous vehicles.

1.5.2 Proposing the adaptation of foreign laws that are suitable for fully autonomous vehicles to the legal framework in Thailand can contribute to the development of an effective regulatory framework.

1.5.3 Proposing an amendment to the liability law for unsafe products to ensure adequate protection for driverless vehicle users is crucial. By revising the legislation, reasonable safeguards can be established to address the unique challenges and potential risks associated with autonomous vehicles.

1.5.4 The proper implementation of laws governing driverless vehicles has the potential to attract investment and foster the development of driverless technology in Thailand, positioning the country as a leader within the ASEAN region. By creating a favorable legal environment, Thailand can encourage innovation, technological advancements, and economic growth in the field of autonomous vehicles.

CHAPTER 2
OVERVIEW OF AUTONOMOUS VEHICLES

2.1 Terminology

Autonomous vehicles are referred to by various terms, including Autonomous Vehicles (AVs), self-driving vehicles, automated vehicles, and driverless vehicles. These terms are used interchangeably to describe vehicles that can make decisions about their movement with minimal or no human intervention, thanks to computer systems. The objective behind autonomous vehicles is to enhance safety, improve driving efficiency, and eventually eliminate the need for human involvement in the driving process.

Automation level of autonomous vehicles

Driverless vehicles come in different levels, which are often referred to as autonomy levels or driving automation levels. These levels categorize the degree of automation and the level of human involvement in the operation of a vehicle. The most commonly used classification system for driverless vehicles is developed by the Society of Automotive Engineers (SAE)[1]. The SAE levels are as follows:

2.1.1 Level 0 No Automation

At this level, the driver has full control and responsibility for all aspects of driving the vehicle. The vehicles do not possess any automated driving features or assistance systems. The driver is solely responsible for tasks such as steering, accelerating, braking, and monitoring the road environment.

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[1] International, SAE 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On- Road Motor Vehicles', <https: / / www. sae. org/ standards/ content/ j3016_202104>, accessed 2 July 2023.

Level 0 vehicles are essentially conventional vehicles without any advanced driver assistance or automation technologies. The driver relies entirely on their own abilities and judgment to operate the vehicles. Examples of Level 0 vehicles include most traditional vehicles on the road today that lack any automated features beyond basic safety systems like ABS (Anti-lock Braking System) or airbags.

2.1.2 Level 1 Driver Assistance

Level 1 autonomous vehicles are vehicles that offer driver assistance features. These features provide limited automation in specific driving tasks, but the driver is still responsible for overall control and safety. Level 1 autonomy is often referred to as "driver assistance" or "hands-on automation."

In Level 1 autonomous vehicles, certain functions, such as adaptive cruise control (ACC) or lane-keeping assist (LKA), can be automated. Here are some common features found in Level 1 autonomous vehicles:

1. Adaptive Cruise Control (ACC): This system automatically adjusts the vehicles' speed to maintain a set distance from the vehicles ahead. It uses sensors, such as radar or cameras, to detect the distance and relative speed of other vehicles.

2. Lane-Keeping Assist (LKA): This feature helps the driver stay within their lane by providing steering input or gentle corrective actions if the vehicles start drifting out of the lane unintentionally. It uses cameras or sensors to monitor lane markings.

3. Automatic Emergency Braking (AEB): This system can detect potential collisions and automatically apply the brakes to prevent or mitigate an accident.

4. Parking Assistance: Level 1 autonomous vehicles may also offer features like automated parking assistance, where the vehicles can help with steering or controlling the acceleration and braking during parking maneuvers.

In Level 1 autonomous vehicles, the driver is still required to be attentive, keep their hands on the steering wheel, and be ready to take control of the

vehicle if necessary. The automated features are designed to assist the driver, but the ultimate responsibility for safe operation lies with the driver.

2.1.3 Level 2 Partial Automation

In Level 2, the vehicle has the capability to assist the driver with both steering and acceleration/deceleration functions under certain conditions. However, the driver must remain engaged, attentive, and ready to take control of the vehicle at any moment.

Characteristics and features of Level 2 autonomous vehicles:

1. Combined Steering and Acceleration/Deceleration: Level 2 vehicles have the ability to control both the steering and acceleration/deceleration functions simultaneously. This means the vehicles can assist with tasks like maintaining lane position and adjusting speed based on traffic conditions.

2. Limited Self-Driving Modes: Level 2 vehicles may offer specific self-driving modes, such as highway driving or traffic jam assistance. In these modes, the vehicles can take over certain driving tasks, but the driver must still monitor the road and be prepared to intervene if needed.

3. Continuous Driver Monitoring: Even though the vehicles can handle some driving functions, the driver is responsible for supervising the driving environment and maintaining situational awareness. The driver must be ready to take control of the vehicles when required.

4. Hands-on Monitoring: Unlike higher autonomy levels, Level 2 requires the driver to keep their hands on the steering wheel and be prepared to take control immediately. The vehicles may use various sensors, such as cameras or steering wheel sensors, to ensure the driver's engagement.

5. Limited Operational Conditions: Level 2 autonomous vehicles are designed for specific driving conditions or environments, such as highway driving or low-speed traffic situations. They may not be capable of operating autonomously in all scenarios or on all road types.

2.1.4 Level 3 Conditional Automation

Level 3 autonomous vehicles represent a significant advancement in automation compared to Level 2. In Level 3, the vehicles are capable of handling most driving tasks under certain conditions without continuous driver intervention. However, when prompted by the system, the driver must be available and prepared to take control of the vehicle.

Characteristics and features of Level 3 autonomous vehicles:

1. Conditional Automation: Level 3 vehicles offer conditional automation, meaning they can autonomously control the vehicles in specific driving scenarios or environments. These scenarios, such as highway driving or specific urban areas, are typically well-defined.

2. Environmental Detection and Response: Level 3 vehicles have advanced sensor systems, such as cameras, radar, LIDAR, and AI algorithms, to detect and interpret the surrounding environment. The vehicles can make informed decisions based on this data to navigate, change lanes, and respond to traffic conditions.

3. Driver Handoff Prompt: When the autonomous system encounters a situation it cannot handle or when the driving conditions exceed its capabilities, it prompts the driver to take over. The driver is expected to be available and ready to assume control within a specified timeframe.

4. Driver Monitoring System: Level 3 vehicles employ a driver monitoring system to ensure the driver's attention and readiness during autonomous driving mode. This is about the driver's engagement level and can request their intervention if necessary.

5. Limited Operational Design Domain (ODD): Level 3 vehicles have a defined operational design domain, specifying the specific conditions and situations in which the autonomous mode is available. Operating outside of the defined ODD may require the driver to assume control.

2.1.5 Level 4 High Automation

Level 4 autonomous vehicles represent a high level of automation where the vehicles can perform most driving tasks without human intervention or oversight but within certain defined operational conditions and environments. Level 4 autonomy is often referred to as "high automation."

Characteristics and features of Level 4 autonomous vehicles:

1. Full Driving Automation: Level 4 vehicles are capable of performing all driving tasks and maneuvers without human intervention within their defined operational domain. They can handle various road conditions, traffic situations, and environments autonomously.

2. Operational Design Domain (ODD): Level 4 vehicles operate within a specific operational design domain, which defines the conditions and scenarios in which the autonomous mode is available. The ODD could be limited to certain geographic areas, specific road types, or favorable weather conditions.

3. No Driver Intervention Required: Unlike lower autonomy levels, Level 4 vehicles do not require the driver to be constantly engaged or ready to take control of the vehicles. The driver can relinquish control and engage in other activities while the vehicle operates autonomously.

4. Safety Overrides: Level 4 vehicles are equipped with safety mechanisms and fallback systems to handle exceptional situations or when the autonomous system encounters scenarios it cannot handle. These safety overrides ensure the safe operation of the vehicles and may prompt the driver to assume control if necessary.

5. Limited Exceptions: While Level 4 vehicles can operate autonomously in most situations, there may still be certain exceptional cases, such as severe weather conditions or road closures, where the vehicles may require driver intervention.

2.1.6 Level 5 Full Automation

Level 5 autonomous vehicles represent the highest level of automation in vehicles. At Level 5, the vehicles are fully capable of performing all driving tasks under any conditions and environments, without the need for human intervention or oversight. Level 5 autonomy is often referred to as "full automation."

Characteristics and features of Level 5 autonomous vehicles:

1. Full Driving Automation: Level 5 vehicles can perform all driving tasks, from basic maneuvers to complex scenarios, without requiring any human input or intervention. They have the capability to navigate diverse road conditions, traffic situations, and environments autonomously.

2. No Driver Presence Required: Unlike lower autonomy levels, Level 5 vehicles do not require a human driver to be present inside about. There is no need for a steering wheel, pedals, or any other traditional driving controls. Passengers can fully occupy themselves with other activities while the vehicle operates autonomously.

3. Wide Operational Design Domain (ODD): Level 5 vehicles are not limited to specific operational domains or conditions. They can operate autonomously in any location, weather conditions, or road types, whether it's urban areas, highways, or off-road terrains.

4. Robust Safety Measures: Level 5 autonomous vehicles incorporate advanced safety systems and redundancies to ensure safe operation at all times. They are equipped with comprehensive sensor arrays, AI algorithms, and communication technologies to detect and respond to any potential hazards or obstacles on the road.

5. Accessibility and Universal Adoption: Level 5 autonomy aims for widespread adoption, making autonomous transportation accessible to everyone, including people with disabilities, elderly individuals, and those without driving licenses. It has the potential to revolutionize transportation systems, reduce accidents, and enhance mobility options.

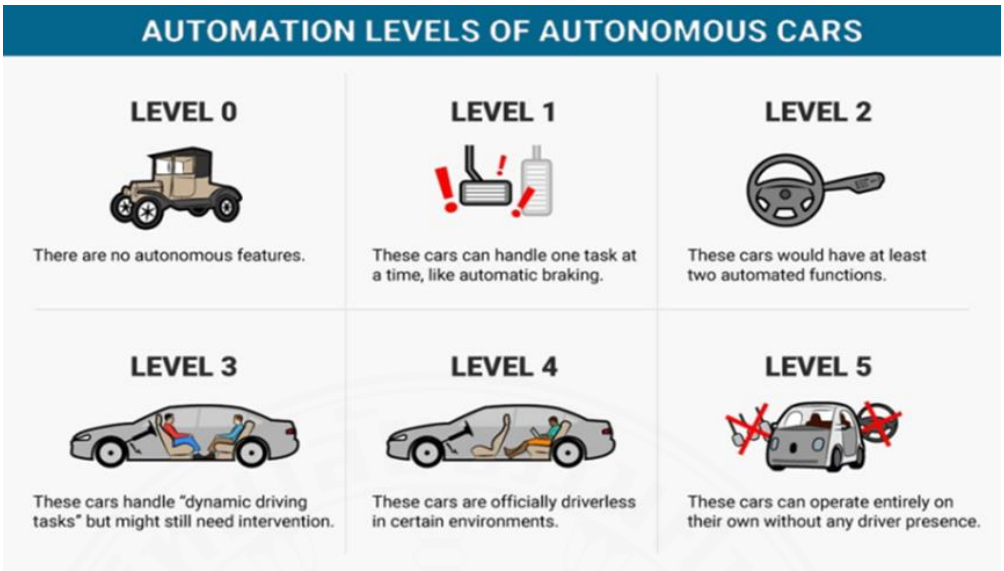

Figure 1 Levels of Autonomous Vehicles

2.2 Components of autonomous vehicles

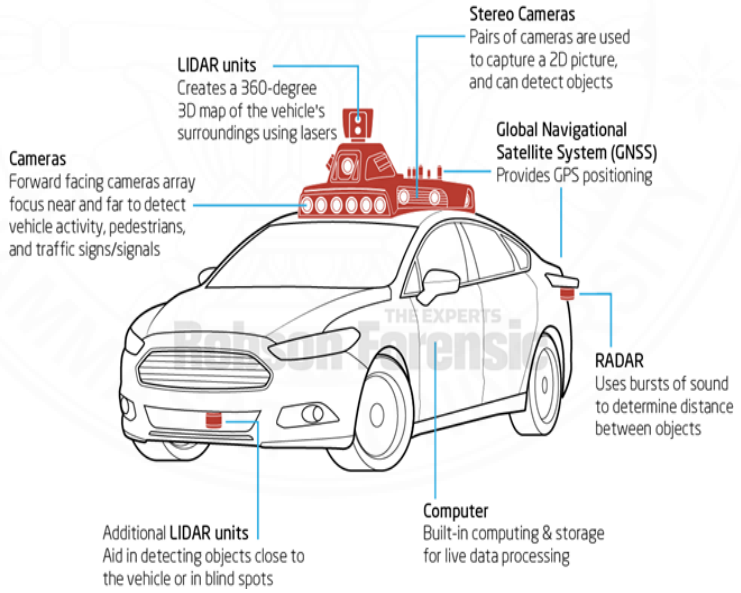

Figure 2 Autonomous Vehicles Component

Some key components of an autonomous vehicle include[2]

[2] Leiss, Peter J. 'The Functional Components of Autonomous Vehicles', <https://www.robsonforensic.com/articles/autonomous-vehicles-sensors-expert>, accessed 2 July 2023.

2.2.1 Sensors

Sensors: Autonomous vehicles are equipped with a variety of sensors, such as radar, LIDAR (Light Detection and Ranging), cameras, and ultrasonic sensors. These sensors provide real-time data about the vehicle's surroundings, including the detection of other vehicles, pedestrians, obstacles, and road conditions.

2.2.2 Control System

Control System: The control system is responsible for processing the sensor data and making decisions based on it. It includes a combination of hardware and software components that analyze the sensor inputs, interpret the environment, and execute appropriate driving commands.

2.2.3 GPS and Mapping

GPS and Mapping: Autonomous vehicles utilize Global Positioning System (GPS) technology to determine their precise location. They also rely on detailed mapping data to understand the road network, lane markings, traffic signs, and other relevant information.

2.2.4 Onboard Computer

Onboard Computer: The onboard computer is the brain of the autonomous vehicle. It performs complex calculations, runs algorithms, and controls the vehicle's operations, including acceleration, braking, and steering. It integrates the sensor data, outputs, and decision-making algorithms to guide the vehicles.

2.2.5 Connectivity

Connectivity: Autonomous vehicles often have internet connectivity vehicles real-time data, update maps, and communicate with other vehicles or infrastructure systems. This connectivity facilitates vehicles-to-vehicles (V2V) and vehicles-to-infrastructure (V2I) communication, enhancing safety and efficiency.

2.2.6 Actuators

Actuators: Actuators convert the computer's instructions into physical actions. In an autonomous vehicle, actuators control the acceleration, braking,

and steering mechanisms. They ensure that the vehicle responds appropriately to the decisions made by the control system.

2.2.7 Redundancy Systems

Redundancy Systems: Autonomous vehicles often incorporate redundancy systems to enhance safety and reliability. Redundancy involves duplicating critical components, such as sensors, computers, and power supply, to ensure continued operation in case of a failure or malfunction.

2.3 Computer software and computer program

This research assumes that the terms "computer software" and "computer program" are interchangeable. Both these terms refer to sets of instructions and data that are processed by a computer to perform specific tasks or functions.

2.3.1 Meaning

“Computer Software or solely Software is nothing but just an assembly of instructions to the computer to get some work as an output.”[3]

“Computer Program is simply a collection of instructions or ordered operations for a computer to perform a specific function or perform particular task and achieve a specific result.”[4]

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[3] Support3 'What is a Computer Software?', <https://www.geeksforgeeks.org/what-is-a-computer-software/?ref=gcse/>, accessed 2 July 2023.

[4] Madhurihammad 'Difference between Software and Program', <https://www.geeksforgeeks.org/difference-between-software-and-program/#article-meta-div>, accessed 2 July 2023.

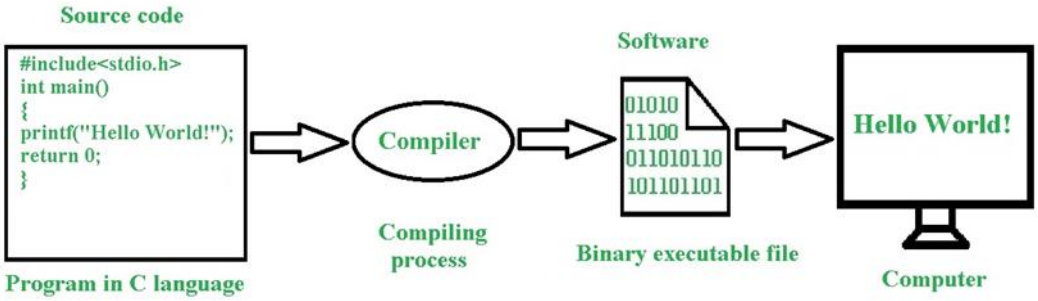

Figure 3 Steps to Develop a Software[5]

2.3.2 Embedded System

"An embedded system is an application that contains at least one programmable computer (typically in the form of a microcontroller, a microprocessor or digital signal processor chip) and which is used by individuals who are, in the main, unaware that the system is computer-based."[6]

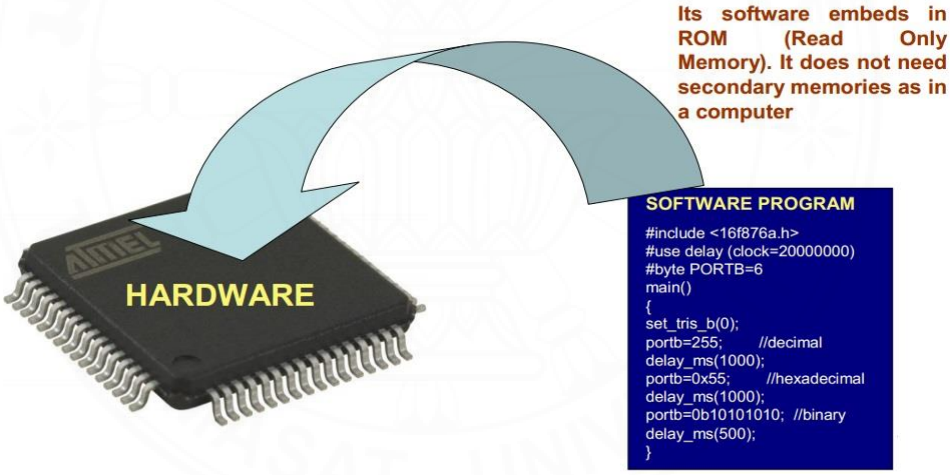

Figure 4 Software Embedded System[7]

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[5] Support3 (2022), 'Steps to develop a software ', (https://www.geeksforgeeks.org/what-is-a-computer-software/?ref=gcse/: @geeksforgeeks).

[6] Michael J. Pont, *Embedded C* (London: Pearson, 2002).

[7] Vinothkhanna, *Embedded Systems Basics* (https://vinothembedded.wordpress.com/2014/06/28/embedded-systems-basics/: vinothembedded, 2014).

When examining the components of an autonomous vehicle, it becomes evident that such a vehicle is categorized as an embedded system. Computer software is a crucial component of an autonomous vehicle, which plays a vital role in making automated decisions.

The computer software in an autonomous vehicle encompasses various modules and algorithms that enable the vehicle to perceive its environment, process sensor data, and make decisions based on predefined rules or machine learning models. These software components work in conjunction with sensors, actuators, and other hardware components to create a comprehensive autonomous driving system.

The software in an autonomous vehicle utilizes advanced technologies such as computer vision, machine learning, and artificial intelligence. The software can analyze visual data from cameras through computer vision techniques and identify objects, pedestrians, traffic signs, and other relevant elements in the vehicle's surroundings. Machine learning algorithms process and interpret sensor data, allowing the vehicle to learn from real-world scenarios and improve its decision-making capabilities over time. These algorithms can recognize patterns, predict behaviors, and adapt to driving conditions.

The responsibility of the computer software in an autonomous vehicle is to analyze sensor data, interpret it, and generate control signals for the vehicle's actuators, including steering, acceleration, and braking. By continuously processing sensor information and making appropriate decisions, the software ensures the safe and efficient operation of the autonomous vehicle.

However, it is essential to note that while the software plays a significant role in enabling automated decision-making, the overall autonomous driving system also relies on other components, such as sensors (e.g., cameras, LIDAR, radar), hardware controllers, and communication systems, to ensure the vehicle's functionality and safety.

In conclusion, computer software is a crucial component of an autonomous vehicle, as it is responsible for processing sensor data, making automated

decisions, and controlling the vehicle's actions. The software forms an integrated embedded system with other hardware components, enabling autonomous driving capabilities.

2.4 Categorization of computer software by delivery mode

The categorization of computer software can be done based on its delivery mode. The software can be classified into different categories depending on how it is distributed and accessed by users. The main delivery modes for computer software are:

2.4.1 Packaged software

Packaged software is a computer program that combines multiple functions or features for various individuals or organizations without being specific to any particular agency or individual.[8]

2.4.2 Custom software

Custom software refers to a computer program specifically designed to serve a particular function or purpose for a specific individual or organization. It is tailored to meet their specific requirements and is not intended for general use by multiple parties.[9]

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[8] MKS075 'Difference between Packaged Software and Custom Software', <https://www.geeksforgeeks.org/difference-between-packaged-software-and-custom-software/>, accessed 2 July 2023.

[9] Ibid.

2.4.3 Free software

Free software refers to software that upholds users' freedom and communal rights. It signifies that users can run, copy, distribute, study, modify, and enhance the software, all made available at no cost.[10]

2.4.4 Open Source Software

Open Source Software (OSS) is a type of software that can be modified according to individual needs and shared with others without violating licensing restrictions. When we refer to software as "Open Source," it means that the source code of the software is publicly available under licenses such as GNU (GPL), which permits users to edit the source code and distribute it.[11]

2.4.5 Shareware Software

Shareware Software is distributed to users on a trial basis, allowing them to use it freely for a limited period. The software includes an inbuilt time limit, such as 30 days or 2 months. Once the time limit expires, the software becomes deactivated. To continue using the software beyond the time limit, users are required to purchase a license or pay for the software.[12]

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[10] Auspicious_Boy 'Difference between Free Software and Open Source Software', <https://www.geeksforgeeks.org/difference-between-free-software-and-open-source-software/?ref=gcse>, accessed 2 July 2023.

[11] Ibid.

[12] Deepanshi_Mittal 'Open Source, Freeware and Shareware Softwares', <https://www. geeksforgeeks. org/ open- source- freeware- and- shareware- softwares/ ?ref= gcse>, accessed 2 July 2023.

CHAPTER 3
LIABILITY ARISING FROM AUTONOMOUS VEHICLES IN THAILAND

3.1 Legal problem with fully autonomous vehicles

This research centers on examining liability laws in Thailand on level 5 fully autonomous vehicles and how they protect the victims in case of accidents. The study reveals that victims have the legal recourse to pursue claims through tort laws and unsafe product liability laws. These legal avenues provide avenues for seeking compensation and holding the responsible parties accountable for any damage caused by fully autonomous vehicles.

3.1.1 Legal scenario in carpool/car sharing.

Figure 5 Carpool/Car Sharing System

Car sharing has gained popularity due to its cost-effectiveness and positive environmental impact. However, introducing driverless vehicles in this service raises legal considerations regarding the applicable laws. In Thailand, two laws have been applied to address this issue: tort law and liability for unsafe products.

Tort law pertains to civil wrongs and the liability for damage caused by negligence or intentional actions. In the context of driverless vehicles used in car sharing, tort law would be relevant in determining liability in case of accidents or injuries involving these autonomous vehicles.

Liability for unsafe products focuses on the legal responsibility of manufacturers and suppliers for damage resulting from unsafe or defective products. Suppose driverless vehicles are considered products within the car-sharing service. In that case, the liability for unsafe products law will come into play, holding manufacturers accountable for any harm caused by faulty autonomous systems or components.

These two laws provide a legal framework to address the unique challenges and potential risks associated with driverless vehicles in Thailand's car-sharing context. Adhering to tort law and liability for unsafe products promotes accountability, consumer protection, and the development of safe autonomous technologies within the car-sharing industry.

3.1.2 Human as driver versus computer software as driver

As autonomous vehicle technology advances, a pertinent question arises: Can existing laws effectively govern this technology? This research examines drivers in two distinct categories: traditional drivers and software-driven drivers.

3.1.1.1 Human as drivers

The driver liability laws in Thailand are stipulated in the Civil and Commercial Code, specifically in Section 420 and Section 437[13], which have been in effect for an extended period. These laws address the issue of fault in cases of accidents involving vehicles. The responsible party at fault could either be the vehicle's owner or the vehicle's driver, and a detailed examination of this matter will be presented in section 3.2.

3.1.1.2 Computer software as drivers

When examining the liability laws in Thailand, specifically those outlined in the Civil and Commercial Code, Section 420 and Section 437, which establish the liability of the driver or owner in the event of an accident, a critical aspect to consider is the role of computer software, which acts on behalf of the driver. The question arises: what laws apply to this computer software?

The Product Liability Act is the law relevant for considering computer software liability as a driver, which will be discussed in section 3.3.

3.2 The applicable law for autonomous vehicles

In the case of level 5 autonomous vehicles, where the driver is replaced by computer software or AI (Artificial Intelligence), it raises the question of whether Thai law adequately supports this type of driving. It becomes essential to evaluate the existing legal framework and determine if it encompasses the unique characteristics and challenges presented by fully autonomous vehicles. Additionally, fairness to all parties involved should be a key consideration when assessing the law's compatibility with this type of driving.

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[13] Samuiforsale 'Thai Civil Law', <https: / / www. thailandlawonline. com/ table- of-contents/thai-private-law-the-civil-and-commercial-code>, accessed 2 July 2023.

3.2.1 Traditional negligence

The liability of tort law for traditional negligence in Thailand appears in the Civil and Commercial Code section 420 “A person who, willfully or negligently, unlawfully injures the life, body, health, liberty, property or any right of another person, is said to commit a wrongful act and is bound to make compensation therefore.”

Section 420 consists of:

1. Whoever acts on willful action or acts with negligence.
2. Act against others illegally.
3. Causing damage to others.
4. The consequences are directly related to the action.

3.2.1.1 Burden of proof

The burden of proof that negligence, is on the claimant’s side. The general principle of the burden of proof specifies that the party who claims has a duty to prove what he claims. As such, the Plaintiff has a duty to prove every element of the offense which is claimed. Therefore, if there is a car accident the injured person of a vehicle accident has a duty to prove that a vehicle driver has committed liability according to the elements in section 420. Applying the principle for traditional negligence must be considered together with Civil and Commercial Code section 437 because section 437 is a strict liability. Section 437 imposes mainly that the burden of proof is the owner or the person who controls the vehicle.

3.2.1.2 Autonomous Vehicles case

In the case of Autonomous vehicles (AVs), Adopting traditional negligence that appears in section 420 in the Civil and Commercial Code is hard to define who is responsible for the damage because of the status of the person in the autonomous vehicle. The status of the person in an autonomous vehicle is only passenger.

3.2.2 Strict liability

Liability to the provisions of the law, the person in control of a vehicle is liable for any damage caused by the vehicle. (Section 437 in Civil and Commercial Code).

Section 437 in the Civil and Commercial Code "A person is responsible for injury caused by any conveyance propelled by mechanism which is in his possession or control, unless he proves that the injury results from force majeure or fault of the injured person.

The same applies to the person who has in his possession things dangerous by nature of destination or on account of their mechanical action."

Issues to consider when adopting section 437

3.2.2.1 Issue of any conveyance propelled by the mechanism which is in his possession or control.

The provisions appearing in Section 437 require the possession or control of the vehicles. It is assumed to be liable in the event that the vehicles caused damage to another person. The owner or in control of a vehicle under this section must be in control of the vehicle or operate the machine in fact while the damage is caused.

In the case of an autonomous vehicle, it is hard to prove who is in control of the autonomous vehicle while an accident among the passenger, designer, or inventor of the autonomous vehicle.

Moreover, section 437 in the Civil and Commercial Code, only defines a proof burden to the occupant or operator of the vehicles. It does not mean when an accident occurs, the owner or in control will be held liable in all cases (in insurance cases). If the occupant or operator of the vehicles can prove that the accident was not due to his will or negligence or was caused by force majeure. The occupant or operator of the vehicles shall not be liable in any way.

The Supreme Court has made rulings on the following issues:

1. Judgment of the Supreme Court No. 2659/2524 (Driver of the vehicles at the time of the accident possessed)

The occupant, as defined by the Civil and Commercial Code, section 437, means the person who used the vehicles as an occupant at the time of the damage or in other words, the person who was in possession of the vehicles at the time of the accident.

2. Judgment of the Supreme Court No. 5544/2552 (The owner of the vehicle but did not travel with is not deemed to be occupant or possessor.)

The plaintiff sued that the 1st defendant drove a motorcycle in which the 2nd defendant was the principal who hired, asked a favor, employed, and experienced the accident. But in the investigation, it did not appear that the 2nd defendant, who was the insured as the principal, had hired, asking as a favor, employed the 1st defendant to drive such a motorcycle and the accident occurred. As such, although the 2nd defendant is the owner of the motorcycle. But when the 2nd defendant did not supervise the motorcycle by sitting during the incident. The 2nd defendant is not responsible for damage caused by motorcycle crashes and deaths and serious harm to victims under Section 437.

3. Judgment of the Supreme Court No. 6249/2541 (The vehicle owner driving himself travels with is deemed to occupant or possessor.)

The owner of the vehicles is liable or jointly liable for the consequences of the violation must be in the event that the owner of the vehicles is the offender, is the driver himself under the Civil and Commercial Code, Section 437, paragraph one. In the case of vehicle owners must be jointly liable with other persons for the consequences of the infringement must be in the event that the infringer is an employee or agent of the owner of the vehicles or the owner of the vehicles was in

possession of the vehicles at the time of the incident by the vehicle owner travels with according to sections 425,427 and 437.

In Thai Tort law, the conclusion reached is that in the event of an accident caused by a fully autonomous vehicle, the owner of the vehicle should be held responsible in accordance with Section 437.

3.2.2.2 Issue of damage, damage must come from vehicles running, not between machines and machines.

Damage in section 437 of the Civil and Commercial Code must come from vehicles while it is operating not include push, pull or flow down a steep slope and hit people.

Obviously, section 437 cannot apply to machine-to-machine accident cases. When there is a vehicle accident, both parties cannot claim the provisions under this section to pass the burden of proof to the other party. Both parties did not benefit from the presumption of section 437, therefore, using section 420 to prove that any party is willful or negligent, which has caused the damage is required.

In an autonomous vehicle accident, Collision between vehicles can not apply Section 437 in the Civil and Commercial Code. Remaining only for accidents that occur between automobile and non-vehicles injured person.

SUMMARY

Table 1 Liability under Section 437

Key points	Interpretation	Related Law
Autonomous Vehicles	any conveyance propelled by a mechanism	Section 437 Liability
Computer Software	His control	Not Mention
Owner/Possessor	His possession	Section 437 Liability

Due to the decision-making capability of the computer software, the responsibility for the vehicle's actions in case of an accident currently falls on the vehicle owner.

3.3 The Product Liability Act.

When the vehicle manufacturer is not the same entity as the owner, and the decision-making process is executed by computer software, the question arises as to whom the victims can hold accountable. Potential parties for legal action may include the vehicle manufacturer, the entity responsible for the computer software's development, the owner of the vehicles, or other relevant stakeholders involved in the supply chain. Determining the specific parties to be sued requires carefully analyzing the applicable laws, contractual relationships, and potential liabilities related to the flawed driverless vehicle. Addressing these questions will help shed light on the legal implications and responsibilities associated with flawed driverless vehicles, ensuring that the rights of the victims are appropriately protected and the liability is assigned to the appropriate parties.

In Thailand, the Product Liability Act of 2008[14] regulates liability for unsafe products. This law establishes strict liability, which holds manufacturers, importers, distributors, and sellers accountable for any harm or damage caused by their defective or unsafe products, regardless of whether they were negligent or at fault.

[14] Sareeya 'The Product Liability Act B.E. 2551', <https://aseanconsumer.org/file/post_image/Product%20Liability%20Act%202008.pdf>, accessed 2 July 2023.

Figure 6 Liability of Entrepreneur

Under the Product Liability Act, if a product is considered defective and causes harm to a consumer, the injured party can seek compensation from any party involved in the product's supply chain, including the manufacturer, importer, distributor, or seller. The injured party is not required to prove negligence on the part of the defendant but must demonstrate the existence of a defect, the resulting harm, and the causal relationship between the defect and the harm suffered.

3.3.1 Products according to the product liability act.

The product liability law in Thailand contains several essential details worth considering. These details may include:

3.3.1.1 Definition of product

Section 4 of the Product Liability Act. states that products refer to all kinds of movable properties that manufacture, import, and sell products in this Act, including agricultural products and electricity.

when examining the meaning of the term "custom software (already mentioned in Chapter 2.)," it becomes apparent that this software aligns with the definition provided in Section 4, which states that an entrepreneur refers to the individual who hires for production. In contrast, packaged software can be purchased

generally. Consequently, a predicament arises if an automobile manufacturer purchases packaged software for their vehicles. Furthermore, it becomes apparent that computer software is not explicitly included as part of the product category. The provision defines products as all kinds of movable property, while computer software is generally recognized as intellectual property. As a result, several doubts arise:

1. Is computer software considered movable property when assessing its classification within the context of the law and its relation to other parts manufacturers?

2. If computer software (packaged software) is available on the market, can it be exempt from liability because it is not employed(hired) by other manufacturers?

3. Should computer software be the same product as electricity?

3.3.1.2 Liability between entrepreneurs

Liability for Damage Arising from The Product Liability Act (B.E.2551.), Section 5 Every entrepreneur shall be jointly liable to the injured person for the damage caused by the unsafe products which have been sold to the consumers no matter whether the damage are intentionally or negligently caused by the entrepreneur

Entrepreneurs must be jointly liable to the injured person in the form of a joint debtor. That is to say, the injured person can claim to be liable for any entrepreneur or all entrepreneurs. This Act states the entrepreneur's liability to the injured person only but it does not mention the relationship between the entrepreneurs and the process of how to recourse especially in the autonomous vehicle production chain that includes software developers, telecommunication companies, and so on.

Proving the ratio of liability in autonomous vehicle accidents is complicated. Moreover, passing the liability on to a manufacturer or entrepreneur will increase production costs, resulting in higher prices for autonomous vehicles as well.

3.3.2 The injured persons/bystanders

Section 4 of The Product Liability Act defines "injured persons" as individuals who have suffered harm or damage due to unsafe goods. Notably, this definition is broader in scope compared to the concept of "injured persons" under Section 437 of the Civil and Commercial Code, where they are commonly referred to as "bystanders."

Bystanders[15] who have suffered harm under the Product Liability Act have a broader protection scope than consumers in Consumer Protection Act. This broader scope extends to juristic persons, such as corporations or other legal entities, who have been affected by unsafe goods supplied by an entrepreneur in accordance with the provisions of the Act.

Entrepreneurs are held liable under two conditions, as illustrated in Figure 6. Firstly, the products must have been sold in the market. Secondly, the products must have caused damage, irrespective of whether the bystanders purchased the products. In other words, the liability of entrepreneurs is not dependent on whether the bystanders themselves acquired the products but rather on the occurrence of damage resulting from the sale of those defective products in the market.

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[15] Nontawat Nawatrakulpisut, *Consumer Protection Act* (Bangkok: Thammasatprinting house, 2020).

3.3.3 Burden of proof

1. The passengers of autonomous vehicles must first prove that the cause of the accident was the use of autonomous vehicles or the autonomous vehicles themselves. (because the fully autonomous vehicle has no driver.)

Even though, the user or the consumer who has suffered damage from the use of the defective product may claim damage from any entrepreneur by the user or the consumer proving that he or she use or store the product in a normal or ordinary way. In autonomous vehicle accident cases, autonomous vehicle users may have new functions in their vehicles beyond their current normal use, such as: updated software, and installation anti-malware so when an accident occurs, it is the injured person's duty to prove that they have fulfilled that new obligation.

2. The injured person is someone who was hit by autonomous vehicles.

Liability for Damage Arising from The Product Liability Act (B.E.2551.) is mainly intended to protect users or consumers of the goods, and not to protect other persons who are not users of the products.

Implementing Liability for Damage Arising from The Product Liability Act (B.E.2551.) to autonomous vehicle accidents is a complicated matter. The injured person (not a user of the autonomous vehicle) is required to prove that the accident was caused by a defect in the product itself and that the owner of an autonomous vehicle has normally used or maintained an autonomous vehicle (It is a legal key element). The burden of proof is practically difficult for the injured person. The burden of proof is divided into two phases.

1) Anyone suffering damage from an autonomous vehicle crash will be required to sue a driver of an autonomous vehicle for liability. This is the problem because the driver is software in a fully autonomous vehicle.

2) A user or owner of an autonomous vehicle, when prosecuted, may claim the Liability for Damage Arising from The Product Liability Act (B.E.2551.) proving that he or she has normally used or maintained an autonomous vehicle. (These are mentioned in section 7)[16]

Two steps of verifying the legal assumption will delay and result in compensating the injured person for the damage.

3.3.4 Type of defective products.

Three types of defect claims and multiple theories are often alleged.[17]

1. Manufacturing defect: a manufacturing defect occurs when a manufactured item fails to perform according to the manufacturer's own specifications.

2. Defects in design: a design defect occurs when a product's risks outweigh the benefits of the design.

3. Defects in warning or instructions: a warning defect occurs when a manufacturer fails to adequately warn a consumer of latent risks. Most cases turn on whether the warning adequately communicates risks. "Adequate" warnings must convey the nature and severity of the hazard and provide instructions for safe use.

[16]Sareeya 'The Product Liability Act B. E. 2551', <https: / / aseanconsumer. org/ file/ post_image/Product%20Liability%20Act%202008.pdf>, accessed 2 July 2023.

[17] Sara D. Schotland, "Overview of U. S. Product Liability Regime," *Arizona Journal of International and Comparative Law* 20, no. 1 (2003).

Defects in the products mentioned in The Product Liability Act do not imply any shortcomings in their quality or usefulness in their regular condition, nor do they undermine the objectives outlined in Section 472 of the Civil and Commercial Code even though use the word defect. The term "defective products," as used in the Product Liability Act, primarily pertains to the lack of safety or insecurity of the products. In other words, for products to be considered defective, they must pose a risk to the safety of individuals and cause harm.

The defect specified in Section 472 is stated as follows.

"Section 472. In case of any defect in the property sold which impairs either its value or its fitness for ordinary purposes, or for the purposes of the contract, the seller is liable.

The foregoing provision applies whether the seller knew or did not know of the existence of the defect."

This type of strict liability in The Product Liability aims to provide consumer protection by ensuring that those involved in the production and distribution of products are held responsible for the safety and quality of their products. It allows victims of unsafe products to seek compensation without establishing fault, making it easier to pursue claims and obtain remedies for damage caused by defective products in Thailand.

3.3.5 The damage under The Product Liability Act.

The damage of bystanders is divided into two levels.[18]

1. Basic damage

Section 420 of the Civil and Commercial Code covers damage related to various aspects, including the life, body, health, liberty, property, or any rights of another person. It encompasses damage covered by other laws as well. However, it does not specifically include damage resulting from an unsafe product.

[18] Nawatrakulpisut.

2. Extended damage

Extended damage refers to additional damage beyond those awarded for violating tort law under the Civil and Commercial Code. This extended damage may cover two specific levels of harm:

2.1 Emotional distress: This refers to damage awarded for the psychological or emotional suffering experienced by the injured party as a result of the incident. It recognizes that harm caused by specific actions or events can significantly impact a person's mental well-being.

In the Civil and Commercial Code, damage for emotional distress or psychological harm are not explicitly addressed or outlined concerning tort law. While Section 438 of the Code allows for compensation that includes the restitution of wrongfully deprived property or its value and damage for any injury caused, it does not explicitly address damage for emotional distress.

Similarly, Section 446 states that the injured person may claim compensation for damage that is not pecuniary loss. However, it does not provide specific guidelines or rules for claiming damage to the mind or emotional distress.

In cases involving emotional distress, the courts often consider various factors, including the nature and extent of the harm, the impact on the individual's well-being, and any supporting evidence provided. While the Civil and Commercial Code may not explicitly outline rules for claiming damage to the mind, the courts may consider the principles of fairness, reasonableness, and proportionality in determining appropriate compensation for emotional distress in tort cases.

2.2 Damage arising from particular circumstances of the entrepreneur: This damage takes into account any unique or specific circumstances related to the entrepreneur or their actions that may have contributed to the harm suffered by the injured party. These circumstances may increase the compensation awarded to address the full extent of the damage.

The burden of proving the facts related to the particular circumstances of the entrepreneur is an additional responsibility that falls outside the scope of tort law in the Civil and Commercial Code. This burden includes demonstrating damage to the emotional distress, as well. These requirements necessitate the victim to present compelling evidence to support their claims regarding the specific circumstances of the entrepreneur and the psychological harm suffered. It is essential to fulfill this burden to establish liability and seek appropriate compensation for damage to emotional distress.

3.3.6 The Product versus Service Issues of computer software.

Computer software has been defined in two acts, namely the Computer Crimes Act B.E. 2007 and the Copyright Act B.E. 2537.

3.3.6.1 Definition of computer software

The definition of computer software is outlined in Section 3 of the Computer-related Crime Act B.E 2007[19]. The definition of computer software is considered a subset of computer data, and it is often not explicitly referred to as "computer software" or "software." Instead, it is described as a "set of instructions," which essentially refers to computer software (see also Chapter 2).

The second definition defines a computer program as an instruction, a sequence of instructions, or something else that makes the computer work as intended. This definition is set forth in Section 4 of the Copyright Act B.E. 2537[20] (see also Chapter 2).

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[19] Campaign for Popular Media Reform, 'Thailand’s 2007 Cybercrime Act in Thai and English', <https://thainetizen.org/docs/cybercrime-2007-th-en/>, accessed 2 July 2023.

[20] The office of the council of state, 'Copyright Act, B.E. 2537 (1994)', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/COPYRIGHT_ACT_1994.pdf>, accessed 2 July 2023.

There are two issues concerning computer software liability within the product liability act:

1. The classification of computer software as a service or product is defined in “Section 4[21] of the act. According to the act, "Products" include all movable properties manufactured or imported for sale, including agricultural products and electricity, except those specified in the Ministerial Regulations.” We will delve into this topic further in section 3.3.6.3.

2. Even if computer software is utilized to produce a product as per the guidelines of section 4, certain types of software still fall outside the entrepreneur's scope. Specifically, packed software is one such category.

3.3.6.2 Criteria for products.

Determining whether computer software is classified as a product or service is of great significance since it impacts the applicability of unsafe product liability laws. If computer software is deemed a service, certain considerations apply, and unsafe product liability laws may not be applicable to the service. Some of the key considerations include:

(1) Tangibility

While it is true that traditionally, the legal definition of a product has been limited to tangible items, the status of computer software remains a gray area due to the unique characteristics of software.

The output or result of computer software may indeed be tangible in the sense that it produces observable and measurable effects, such as generating documents or controlling physical devices. Additionally, the value of software can be significant, often surpassing the value of physical products.

[21] Sareeya 'The Product Liability Act B.E. 2551', <https://aseanconsumer.org/file/post_image/Product%20Liability%20Act%202008.pdf>, accessed 2 July 2023.

However, it is essential to consider that the tangibility of the output does not necessarily equate to the tangibility of the software itself. Computer software is fundamentally intangible, consisting of lines of code and algorithms stored in electronic format, and it does not have a physical presence.

The classification of software as tangible or intangible has significant legal implications, particularly regarding liability under product liability laws. While some arguments may point towards considering software as tangible due to its outputs, other considerations, such as the nature of transactions (licensing agreements), its intangible nature, and the lack of physical embodiment, could support classifying it as intangible.

As technology and legal interpretations continue to evolve, it remains crucial for courts and policymakers to address these complexities and provide clear definitions to determine the legal status of computer software. Until then, this issue will likely remain a subject of ongoing debate and legal scrutiny.

(2) Ownership

The concept of ownership can indeed play a significant role in distinguishing different instances of software use and identifying the nature of the product. Ownership rights and licensing agreements are crucial factors that help determine whether the software is treated as a product or a service. Here are some key points to consider:

1. Licensed Software: When users purchase software, they are often acquiring a license to use the software, rather than owning the software outright. The terms and conditions of the license agreement can define the scope of usage and the rights granted to the user. In this case, the software is typically considered a service rather than a tangible product.

2. Ownership of Intellectual Property: The ownership of the intellectual property rights in the software can be a critical factor in determining its classification. If the software company retains full ownership of the intellectual property, and users are granted a license to use it, the software is likely to be treated as a service.

3. Customization and Adaptation: The level of customization or adaptation allowed by the software can also impact its classification. If the software is highly customizable and tailored to specific users' needs, it may lean more towards being considered a service.

4. Product Licensing vs. Service Agreements: When the agreement between the user and the software provider involves the sale or licensing of a specific version of the software, it may be seen as a product. On the other hand, if the agreement involves ongoing support, updates, and maintenance, it is more likely to be perceived as a service.

5. Ownership of Copies: The concept of ownership can also apply to physical copies of software. If users own a physical copy (e.g., a CD or DVD), the software might be seen as a product. However, this aspect has become less common with the rise of digital distribution and cloud-based services.

It is important to note that the determination of whether software is treated as a product or a service can vary depending on the jurisdiction and specific legal contexts. As technology continues to advance and new business models emerge, legal frameworks may need to adapt to address the complexities of software usage and ownership.

(3) Possibility for correcting defects

Correcting defects is a common practice in both software products and software services. All software, regardless of its classification, may require updates or patches to address issues or enhance its functionality. Mortimer[22] argues that the ability to correct defects implies that the entity is a product. Services on the other hands cannot be corrected at a later date.

[22] Mortimer, Hope (1989), 'Computer-Aided Medicine: Present and Future Issues of Liability', Computer/Law Journal, 9 (2), 177.

(4) Method of distribution

The classification of computer software as a service or a product can often depend on whether the software is custom-made for a specific client or mass-produced for general use. Here's a breakdown of the distinction:

1. Custom-made Software (Service): When computer software is specifically developed or tailored to meet the unique requirements of a particular client or organization, it is typically considered a service. In this scenario, the software company provides personalized solutions and may engage in ongoing support and maintenance for that specific client. The software is not available for general sale to the public.

2. Mass-Produced Software (Product): Mass-produced software (packaged software) refers to software that is developed for general use and is made available for purchase or licensing to the public at large. This type of software is not personalized for a specific client and is designed to be used by multiple users or organizations.

3.3.6.3 The Similarity between electricity and computer software

1. Computer software is classified as a form of intellectual property, as stated in Section 4 of the Copyright Act (No. 4) B.E. 2561 (2018)[23]. Additionally, according to Section 140 of the Civil and Commercial Code[24], computer software should be regarded as movable property.

2. Electricity can be treated as movable property within the legal context.

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[23] the office of the council of state, 'Copyright Act, B. E. 2537 (1994) ', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/COPYRIGHT_ACT_1994.pdf>, accessed 2 July 2023.

[24] Samuiforsale 'Thai Civil Law', <https: / / www. thailandlawonline. com/ table- of-contents/thai-private-law-the-civil-and-commercial-code>, accessed 2 July 2023.

3. Computer software shares similarities with electricity as both are forms of energy, with computer program impulses akin to electric current. Therefore, computer software should be categorized as a product, similar to electricity. While the distribution of electricity through transmission lines may be considered a service, the electricity itself has traditionally been regarded as a product.[25]

3.3.8 Conclusions

1. Computer Software as a Service

If computer software is considered a service, a manufacturer's liability is typically limited in tort unless there is evidence of negligence or intentional misconduct. One way to define a service is as "something that is rarely duplicated, offering limited opportunities for quality control or defect testing."

2. Computer Software as a Product

With the significant increase in the use of computer software, the marketing, packaging, and distribution of software have undergone significant changes. It is now rare for a software manufacturer to develop a program for a specific, singular purpose. Instead, computer programs often modify previously developed software or are tailored to specific tasks but distributed to various consumers. In such cases, computer software is considered a product.

Based on the study conducted to resolve the ambiguity surrounding the interpretation of computer software, the researcher agrees that computer software should be considered a product under Section 4 of the law. This conclusion suggests that computer software fall within the scope of the Products Liability Law, and their treatment should align with the provisions and principles applicable to other product covered by the law.

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[25] Birnbaum, L. Nancy (1988) , 'Strict Products Liability and Computer Software', Computer/Law Journal, 8 (2), 135.

By categorizing computer software as a product, it ensures that they are subject to the regulations and responsibilities outlined within the legal framework. This interpretation provides clarity and consistency in applying the law to computer software, allowing for a more comprehensive understanding of their liability and ensuring appropriate legal protections for users and consumers.

SUMMARY

Table 2 Liability Manufacturer under The Product Liability Act.

Key points	Interpretation	Related Law
Computer software	Not mention	Not mention
Movable in immovable property	Not mention	Not mention
Movable in movable property	Not mention	Not mention

3.4 No-Fault liability with insurance

Road Accident Victims Protection Act 2535 (B.E.) requires all vehicles to have at least third-party insurance to protect and provide assistance to people injured or killed in a vehicle accident. Moreover, this Act expects injured persons to receive immediate medical care, without having to consider whether medical expenses can be billed or not.

Applying Road Accident Victims Protection Act 2535 (B.E.)[26] to driverless vehicles Under the provisions of this Act, vehicles that must be insured are all types of vehicles, all types of vehicles in accordance with the Automobile Law, the Law of Transport, and the Military Vehicle Law. Whether the vehicle is running with engine power, electric power, or other energy. Exclude section 9

[26] The Office of The Council of State, 'Road Accident Victims Protection Act', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/Road_Accident_Victims_Protection_Act_BE_2535_(1992).pdf>, accessed 2 July 2023.

Section 9. As for the conveyance registered in a foreign country which is temporarily brought for use in the Kingdom by an owner who has no domicile or residence in the Kingdom, the owner must provide insurance against loss for victims in the amount and under the rule and condition prescribed in the Ministerial Regulation. Therefore, most vehicles are required to have insurance under this law, although some types of vehicles are not registered by the Department of Land Transport, if the vehicle is considered to be operated with engine power, electric power, or other energy, it is considered a car that must have insurance under the Act.

The person liable to take insurance under this Act is the vehicle owner, vehicle occupant as a vehicle leasing, and vehicle importer registered in foreign countries to use in the country. Those who are covered under this Act are all people who suffer from motor vehicle accidents, whether they are drivers, passengers, or pedestrians if they suffer damage to their lives, bodies, or health due to an accident. Arising from the vehicle will be covered. Considering the definition of a vehicle as shown in this Act, it could be interpreted that an autonomous vehicle is likely within the scope of the vehicle definition for insurance under this Act as well.

In the case of applying a no-fault liability with insurance for autonomous vehicles in Thailand should cover the damage already done.

3.5 ROAD TRAFFIC ACT, B.E. 2522 (1979).

Thailand's ROAD TRAFFIC ACT, B.E. 2522 (1979) holds significance as it primarily governs travel-related aspects compared to other forms of transportation. This Act is crucial in establishing rules and guidelines for the safe interaction between vehicles, pedestrians, and other road users. It provides a framework for regulating and managing traffic to ensure the smooth flow of transportation and enhance road safety.

According to the ROAD TRAFFIC ACT, B.E. 2522 (1979)[27], public offenses related to traffic violations are considered compoundable offenses, with the state being the sole injured party. In such cases, the private sector does not have the authority to initiate legal proceedings or join as a plaintiff alongside the public prosecutor. The law restricts the right to prosecute offenses and limits the involvement of private individuals in these cases.

section 4 subsection 16 of the ROAD TRAFFIC ACT, B.E.2522(1979) states that

> "Section 4. In this Act:
> (16) "Vehicle" means a three or more wheels' conveyance driven by engine, electricity or other power, except that driving on railroad;"

Based on the definition of a vehicle according to the Land Traffic Act, it is evident that autonomous vehicles fall under its scope as they utilize engines, electricity, or other power sources. The Act encompasses autonomous vehicles within its provisions, considering them vehicles powered by various energy or propulsion.

[27] The Office Of The Council Of State, 'Road Traffic Act, B. E. 2522 (1979) ', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/Road_Traffic_Act_BE_2522_(1979).pdf>, accessed 2 July 2023.

CHAPTER 4

LIABILITY ARISING FROM AUTONOMOUS VEHICLES IN ESTONIA

Estonia is recognized as one of the world's most advanced digital economies and information societies. which is the result of electronic revolution policy The e-Revolution, announced by the Estonian government in the 1990s, aims to improve the bureaucracy and develop the technical infrastructure of e-Services to be more efficient and interconnected. Government information is convenient, fast, and secure. A study of Estonian self-driving vehicle liability law in comparison with Thai law will open up new perspectives on the development of Thai law.

Laws that apply when self-driving vehicles are involved in accidents in Estonia.

As a researcher, my primary focus has been on tort laws and unsafe product liability laws in relation to self-driving vehicles involved in accidents in Estonia.

4.1 Strict liability

Section 1056[28] of Estonian law addresses tort liability for negligence, which is applicable to conventional vehicles. The researcher's objective was to examine whether this law could be extended to encompass autonomous vehicles. Specifically, The LOA's strict liability in section § 1056 Liability for damage caused by a major source of danger, states:

"(1) If damage is caused resulting from danger characteristic to a thing constituting a major source of danger or from an extremely dangerous activity, the person who manages the source of danger shall be liable for causing damage regardless of the person's culpability. A person who manages a major source of danger shall be liable for causing the death of, bodily injury to, or damage to the health of a victim, and for damaging a thing of the victim unless otherwise provided by law.

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[28] Riigikogu 'Law of Obligations Act', <https://www.riigiteataja.ee/en/eli/506112013011/consolide>, accessed 2 July 2023.

(2) A thing or an activity is deemed to be a major source of danger if, due to its nature or to the substances or means used in connection with the thing or activity, major or frequent damage may arise therefrom even if it is handled or performed with due diligence by a specialist. If liability for causing damage by means of a source of danger is prescribed by law, anything or activity similar to such source of danger is also deemed to be a source of danger, regardless of whether the person who manages the source of danger is culpable or not."

The central aspect of this matter concerns the interpretation of autonomous vehicles as a major source of danger[29], as delineated in subsection 1. Moreover, subsection 2 provides a subsequent definition of this danger based on its nature or the means employed. When an accident is attributed to an autonomous vehicle, subsection 1 firmly establishes that the autonomous vehicle is regarded as a major source of danger. This interpretation is reinforced by subsection 2, which elucidates that a major source of danger can originate from either the vehicle's condition or its utilization.

When Sections 1056 and 1057 are applied together, the key issue that requires interpretation revolves around the roles of the driver and owner in the context of fully autonomous vehicles. This is primarily due to the fact that fully autonomous vehicles are driven by computer programs, Section 1057 states that:

"§ 1057. Liability of possessor of motor vehicle

A direct possessor of a motor vehicle shall be liable for any damage caused upon the operation of the motor vehicle"

Estonian law establishes the principle that the direct possessor of a vehicle bears responsibility for any damage caused by that vehicle. The definition of a direct possessor of a motor vehicle is outlined in subsection 1 of § 33 of the Law of Property, Estonian law, which states that:

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[29] Taivo Liivak and Janno Lahe, (2019), 'Strict Liability For Damage Caused By Self-Driving Vehicles: The Estonian Perspective', Baltic Journal Of Law & Politics, 12 (2), 1.

"§ 33. Possessor[30]

(1) A possessor is a person who has actual control over a thing.

(2) A person who possesses a thing on the basis of a commercial lease, residential lease, deposit, pledge, or other relationship which grants the person the right to possess the thing of another person temporarily is a direct possessor, while the other person is an indirect possessor....."

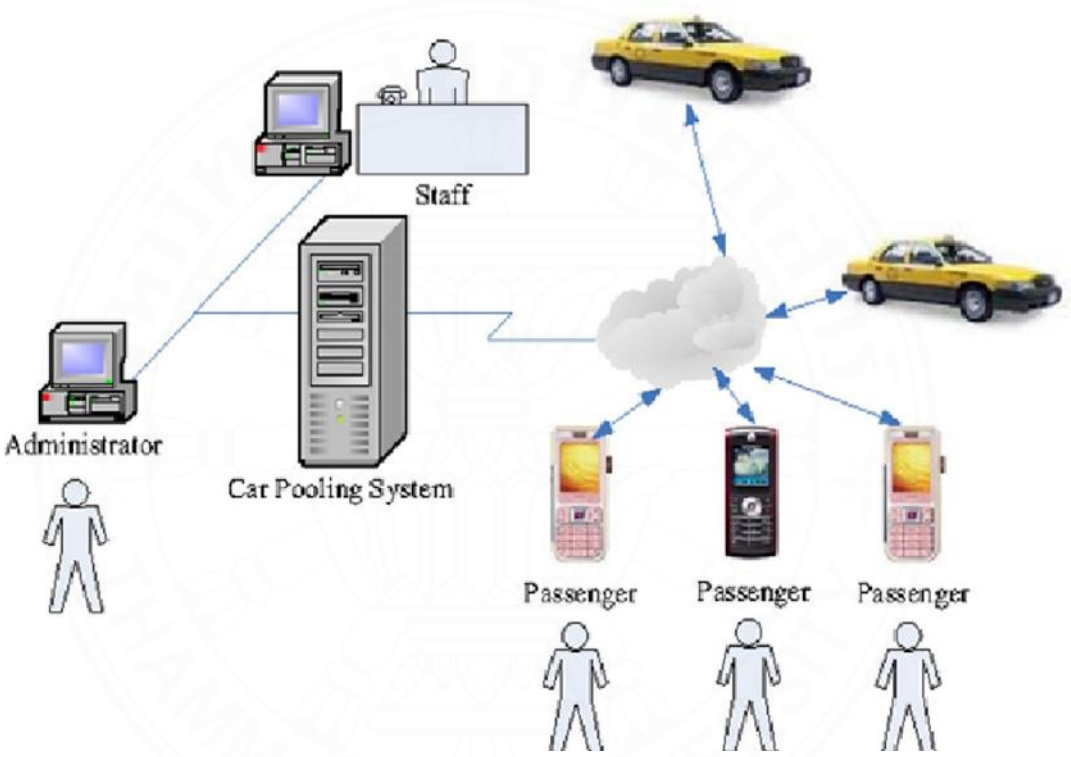

Figure 7 Carpool System

Upon reviewing the aforementioned section, it becomes evident that, according to Estonian law, the owner of the vehicle does not qualify as the direct possessor. Instead, the direct possessor refers to the individual who exercises direct control over the operation of an autonomous vehicle. In this particular scenario (carpooling using a fully autonomous vehicle),

[30] Riigikogu 'Law of Property Act', <https://www.riigiteataja.ee/en/eli/510072014007/consolide>, accessed 2 July 2023.

where the driver is a computer program, the individual responsible for issuing commands or instructions to the program assumes liability. This liability provision is stipulated in subsection 1 § 1056 as stated:

"A person who manages a major source of danger shall be liable for..."

The conclusion reached is that the existing Estonian tort law continues to be applicable in the context of autonomous vehicle utilization. Moreover, it can be effectively employed in the context of car sharing, thus supporting the development of autonomous vehicle systems.

SUMMARY

Table 3 Liability under The Tort Law of Estonia

Key points	Interpretation	Related Law
Autonomous vehicle	A major source of danger	§1056 Liability
Direct Possessor	a person who has actual control	§ 33 (Law of Property) § 1057 Liability
Direct Possessor	The owner (a person who grants the person the right to possess the thing of another person temporarily)	§ 33 (Law of Property)
Computer software	- A person who manages a major source of danger - Owner	§ 1056 Liability § 1057 Liability

4.2 Product liability

The enactment of the Unsafe Product Liability Law aims to provide recourse for accidental victims who have suffered harm due to the utilization or consumption of unsafe products that have already been distributed in the market. Estonia has established an unsafe product liability law, specifically articulated in Sections 1061 to 1067 of the Law of Obligations Act.

The focus of this research is to assess whether the unsafe product liability law offers sufficient support for manufacturers of self-driving vehicles who utilize components from various companies or brands. Of particular interest is the incorporation of a computer program that commands the operation of an autonomous vehicle.

"§ 1061. Liability of producer

(1) The producer shall be liable for causing the death of a person and for causing bodily injury to or damage to the health of a person if this is caused by a defective product…"

According to Section 1061, the manufacturer is held accountable for any damage resulting from the use of unsafe goods.

The subsequent aspect to consider is the legal obligations in situations where products are manufactured by multiple entities. Section 1062[31] offers the definition of multi-manufacturer goods as follows:

"§ 1062. Producer

(1) The following are deemed to be producers:

1) a person who manufactures a finished product, raw material, or part of a product…"

According to this definition, it is apparent that the supplier of any part of the product is regarded as the manufacturer.

Regarding self-driving vehicles, Estonian legislation addresses the inclusion of a computer program in section 1063, which provides the following definition:

"§ 1063. Product

(1) Any movable is deemed to be a product, even if the movable constitutes a part of another movable or if the movable has become a part of an

[31] Riigikogu 'Law of Obligations Act', <https://www.riigiteataja.ee/en/eli/506112013011/consolide>, accessed 2 July 2023.

immovable, and electricity and computer software are also deemed to be movables…”

SUMMARY

Table 4 Definition of Product under Estonian Law

Key points	Interpretation	Related Law
Computer software	Movable property (Product)	§ 1063
Movable in immovable	Product	§ 1063
Movable in movable	Product	§ 1063

4.2.1 analysis

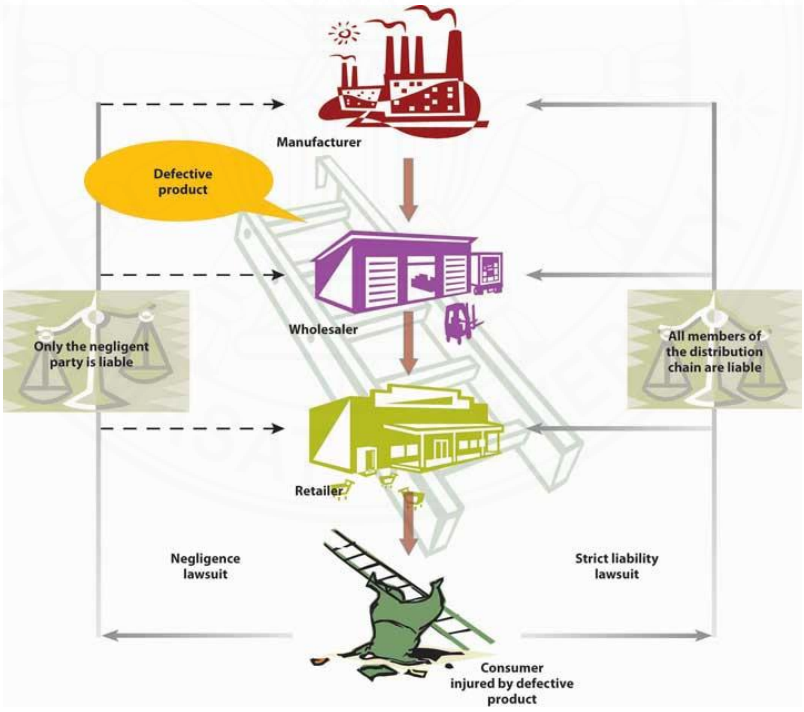

Figure 8 Negligence versus Strict Liability[32]

1. One notable advantage of Article 1063 of the Estonian law is that it recognizes computer software as a product, placing it on equal footing with

[32] Collins, Karen (2000), 'Product Liability', (Unnamed Publisher).

electricity. This provision encourages programmers to exercise caution when developing software, not only for the benefit of autonomous vehicles but also for other embedded computing systems, such as medical devices or washing machines. The law promotes accountability and quality assurance in software development across various industries and applications by treating computer software as a product.

2. This provision helps eliminate various interpretation issues, as it clarifies that movable properties installed within other movable properties or incorporated into them are also considered products. By extending the definition to encompass such cases, the law provides clarity and consistency in treating these movable properties as products. This ensures that they are subject to the appropriate legal standards and protections applicable to products, regardless of their installation or incorporation into other movable properties.

3. At the moment, Thailand's product liability law does not explicitly categorize computer software as a product, unlike tangible items like electricity. Given this ambiguity, manufacturers seeking to exercise caution when producing computer software could consider adopting guidelines similar to those outlined in Estonian law. Estonia's approach involves holding all members of the distribution chain liable, as demonstrated in Figure 8.

By following such guidelines, software manufacturers, distributors, and other entities in the supply chain would be held accountable for any defects or harm caused by the software. This broader liability framework would potentially enhance consumer protection and encourage software companies to take extra precautions in ensuring the quality and safety of their products.

Adopting a comprehensive liability system for computer software in Thailand could provide clarity and consistency in addressing potential issues related to software defects and their consequences. It would also align with emerging global practices in the technology industry, where software is increasingly central to various aspects of modern life.

CHAPTER 5
CONCLUSIONS AND RECOMMENDATIONS

5.1 CONCLUSIONS

With the introduction of autonomous vehicles in Thailand and other countries, particularly fully autonomous vehicles or connected vehicles, there are concerns regarding regulations in Thailand. One significant issue is related to liability and whether existing laws are adequate for the technology of connected vehicles.

Liability in the context of fully autonomous vehicles refers to the responsibility for any damage, accidents, or injuries caused by these vehicles. In traditional human-driven vehicles, liability is typically assigned to the driver or owner. However, in the case of autonomous vehicles, where the driving task is delegated to the vehicle's technology, determining liability becomes more complex.

The liability associated with connected autonomous vehicles can be attributed to various parties, including the vehicle manufacturer, technology provider, or even the owner/operator of the vehicle.

Governments and lawmakers need to assess and adapt existing laws or introduce new legislation tailored explicitly to autonomous vehicles to ensure the effective regulation of autonomous vehicles. These regulations should encompass various aspects, such as liability assignment and safety standards.

Therefore, while Thailand and other countries may have some existing laws that can be applied to autonomous vehicles, further developments in legislation are necessary to adequately address the unique challenges and opportunities presented by autonomous vehicle technology.

Based on research, the liability for tort under the Civil and Commercial Code and the liability for The Product Liability Act are relevant considerations when discussing the liability associated with autonomous vehicles. Here are some details regarding these legal concepts.

5.1.1 Liability for tort (Civil and Commercial Code)

Under Thailand's Civil and Commercial Code, tort liability is the legal responsibility for damage caused by wrongful acts or negligence. In the context of autonomous vehicles, if an accident or injury occurs due to the actions or omissions of an autonomous vehicle, the principles of tort law may come into play.

In general, to establish tort liability, the following elements need to be proven:

1. The existence of a wrongful act or negligence.
2. A causal connection between the wrongful act or negligence and the resulting damage.
3. The damage suffered by the injured party.

According to Section 437 of the Civil and Commercial Code of Thailand, when an accident involving an autonomous vehicle occurs, the owner of the vehicle can be held liable under certain circumstances. Section 437 states that if an accident is caused by a vehicle powered by machinery or property that is dangerous by its nature or intended to use the mechanism of that property, the owner of the vehicle shall be liable.

In the case of a fully autonomous vehicle, where the vehicle operates without human intervention, it is possible to interpret it as a vehicle powered by machinery or property that is dangerous by its nature. As a result, the owner of the fully autonomous vehicle can be held liable for any damage caused by the vehicle, even if they were not directly at fault for the accident.

Therefore, under Section 437 of the Civil and Commercial Code, the owner of a fully autonomous vehicle can potentially be held liable for accidents caused by the vehicle as long as the vehicle can be categorized as powered by machinery or property that is inherently dangerous or intended to use the mechanism of that property.

Based on the research, Section 437 of Thailand's Civil and Commercial Code can indeed be applied to fully autonomous vehicles. As per Section 437, if an accident occurs due to a vehicle powered by machinery or property that is inherently dangerous or intended to use the mechanism of that property, the owner of the vehicle can be held liable for any damage caused.

Since fully autonomous vehicles operate using complex technology and can be considered vehicles powered by machinery, they can fall within the scope of Section 437. This means that even though the vehicle is autonomous and operates autonomously, the owner can still be held liable for accidents or damage resulting from the vehicle's operation. Therefore, Section 437 of the Civil and Commercial Code can serve as a basis for determining liability in accidents involving fully autonomous vehicles in Thailand.

5.1.2 Product liability

Thailand's current law on product liability for self-driving vehicle technology faces two main issues. Firstly, there is ambiguity in interpreting the classification of movable property, specifically in relation to the computer programs that are integral to autonomous vehicle operation. While the law considers the product as movable property, computer software is, in fact, a distinct form of property referred to as intellectual property.

Secondly, a significant problem arises when manufacturers procure ready-made computer programs or packed software for use in autonomous vehicles, rather than being directly involved in their development. This raises concerns regarding liability in cases where accidents or malfunctions occur due to inherent flaws or errors within these purchased programs.

Currently, in Thailand, there is no definitive interpretation regarding whether computer software should be classified as a service or a product. Based on the research conducted, it is arguable that computer software should be categorized as a product. This is because computer software forms an integral part of computer systems embedded in devices that significantly impact people's lives, such

as medical equipment, driverless cars, washing machines, and other electrical equipment. By considering computer software as a product, it ensures appropriate legal frameworks and standards are applied to regulate its development, distribution, and use, providing necessary protections for users and consumers.

Given these concerns, it is essential to revise the existing product liability law in Thailand to address these specific issues and provide clarity regarding the liability of self-driving vehicle manufacturers.

For a number of reasons, the research suggests that computers should be explicitly identified as products, just like electricity.

1. Computer software available on the market is typically packaged software rather than custom software. Packaged software refers to software that is not specifically designed for a particular device but is instead mass-produced for a wide range of users. As a result, the software maker may argue that they were not commissioned to produce it. Since packaged software is not tailored to a specific device or commissioned by a particular entity, the software maker may not have a contractual obligation to any specific client. Instead, they develop the software based on their own initiative, targeting a wider market.

It is important to note that the distinction between packaged software and custom software is relevant in determining the legal responsibilities and liabilities associated with the software. Depending on the circumstances and the applicable laws, the software maker's claim of not being commissioned to produce the software may have implications in terms of warranties, support, and potential liabilities.

2. Computer software operates within critical devices, particularly in embedded computing systems like medical devices. Additionally, autonomous vehicles have a significant impact on numerous individuals.

5.2 RECOMMENDATIONS

In order to promote the cautious development of computer software, the researcher suggests that the product liability law in Thailand should be amended by drawing inspiration from countries that have established themselves as leading digital societies, such as Estonia. By comparing the existing laws and regulations, Thailand can identify potential gaps and areas for improvement in its product liability framework.

Keys considerations for the amendment could include the following:

1. Recognizing computer software as a distinct product category within the law.

2. Ensuring liability provisions cover computer software-related issues, such as software defects and vulnerabilities.

3. Implementing clear guidelines for determining responsibility and liability in cases involving software-related harm.

4. Enhancing consumer protection by imposing strict liability on software developers and manufacturers for any damage caused by their products.

5. Establishing mechanisms for effective enforcement and redress, including procedures for reporting software-related issues, seeking compensation, and holding responsible parties accountable.

By undertaking this comparative analysis and making necessary amendments, Thailand can align its product liability law with the evolving digital landscape, fostering a safer and more accountable software development and usage environment.

For all the reasons mentioned above, Section 4 of the Product Liability Act B.E. 2551 (2008) of Thai law should be amended by defining computer software as a product. Furthermore, it is recommended to add clarification that movable property, as well as other movable property or other immovable property, shall also be regarded as products in accordance with the laws of Estonia.

From

“Products” means any kind of movable properties manufactured or imported for sale including agricultural products and electricity except the products specified in the Ministerial Regulations.

To

“Products” means any kind of movable properties, even if the movable constitutes a part of another movable or if the movable has become a part of an immovable, manufactured, or imported for sale including agricultural products and electricity and computer software except the products specified in the Ministerial Regulations.

REFERENCES

Books

Nawatrakulpisut, Nontawat (2020), Consumer Protection Act (Bangkok:Thammasat printinghouse).

Articles

Birnbaum, L. Nancy (1988), 'Strict Products Liability and Computer Software', Computer/Law Journal, 8 (2).

Lahe, Taivo Liivak and Janno (2019), 'Strict Liability for Damage Caused By Self-Driving Vehicles: The Estonian Perspective', Baltic Journal Of Law & Politics, 12 (2).

Miyaki, Patrick T. (1992), 'Computer Software Defects: Should Computer Software Manufacturers Be Held Strictly Liable for Computer Software Defects?', Santa Clara Computer and High-Technology Law Journal, 8 (1).

Mortimer, Hope (1989), 'Computer-Aided Medicine: Present and Future Issues of Liability', COMPUTER/LAW JOURNAL, 9 (2).

Schotland, Sara D. (2003), 'Overview of U.S. Product Liability Regime', Arizona Journal of International and Comparative Law 20 (1).

Electronic Media

Pont, Michael J. (2002) Embedded C [online text], Pearson.

Other Materials

Auspicious_Boy 'Difference between Free Software and Open Source Software', <https://www.geeksforgeeks.org/difference-between-free-software-and-open-source-software/?ref=gcse>, accessed 2 July 2023.

Deepanshi_Mittal 'Open Source, Freeware and Shareware Softwares', <https://www.geeksforgeeks.org/open-source-freeware-and-shareware-softwares/?ref=gcse>, accessed 2 July 2023.

International, SAE 'Taxonomy and Definitions for Terms Related to Driving Automation Systems for On-Road Motor Vehicles', <https://www.sae.org/standards/content/j3016_202104>, accessed 2 July 2023.

Leiss, Peter J. 'The Functional Components of Autonomous Vehicles', <https://www.robsonforensic.com/articles/autonomous-vehicles-sensors-expert>, accessed 2 July 2023.

Madhurihammad 'Difference between Software and Program', <https://www.geeksforgeeks.org/difference-between-software-and-program/#article-meta-div>, accessed 2 July 2023.

MKS075 'Difference between Packaged Software and Custom Software', <https://www.geeksforgeeks.org/difference-between-packaged-software-and-custom-software/>, accessed 2 July 2023.

Reform, Campaign for Popular Media 'Thailand's 2007 Cybercrime Act in Thai and English', <https://thainetizen.org/docs/cybercrime-2007-th-en/>, accessed 2 July 2023.

Riigikogu 'Law of Obligations Act', <https://www.riigiteataja.ee/en/eli/506112013011/consolide>, accessed 2 July 2023.

Riigikogu 'Law of Property Act', <https://www.riigiteataja.ee/en/eli/510072014007/consolide>, accessed 2 July 2023.

Samuiforsale 'Thai Civil Law', <https://www.thailandlawonline.com/table-of-contents/thai-private-law-the-civil-and-commercial-code>, accessed 2 July 2023.

Sareeya 'The Product Liability Act B.E. 2551', <https://aseanconsumer.org/file/post_image/Product%20Liability%20Act%202008.pdf>, accessed 2 July 2023.

The office of the council of state, 'Copyright Act, B.E. 2537 (1994)', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/COPYRIGHT_ACT_1994.pdf>, accessed 2 July 2023.

The Office of The Council of State, 'Road Accident Victims Protection Act', <http://web.krisdika.go.th/data/outsitedata/outsite21/file/Road_Accident_Victims_Protection_Act_BE_2535_(1992).pdf>, accessed 2 July 2023.

Support3 'What is a Computer Software?', <https://www.geeksforgeeks.org/what-is-a-computer-software/?ref=gcse/>, accessed 2 July 2023.

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