AIR POLLUTION LAWS FOR INDUSTRIAL FACILITIES: A COMPARATIVE STUDY OF FOREIGN LEGISLATION

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Abstract - Thailand currently has a large number of industrial facilities, many of which emit pollutants such as carbon dioxide, nitrogen dioxide, and sulfur dioxide during their operations. These emissions contribute significantly to air pollution, adversely impacting human health, natural resources, and the environment. This article aims to examine air pollution laws in the United States and Japan to provide recommendations for aligning Thai legislation with international standards and reducing harmful emissions. The comparative study reveals that while Thailand has legal frameworks addressing air pollution, including civil and criminal penalties, the issue persists. A comparison with the United States highlights the effectiveness of the Clean Air Act 1990, which imposes significantly higher fines on violators. Similarly, Japan's Smoke and Soot Law 1962 specifically targets industrial emissions of dust and smoke, implementing stringent penalties for pollutants that pose health risks. Both countries' legal systems enforce stricter punitive measures than Thailand, resulting in notable reductions in harmful emissions. Therefore, this article suggests revising Thailand's air pollution laws to increase penalties and enhance enforcement. By adapting legislation to reflect the current socio-economic landscape and the gravity of the problem, Thailand can foster greater compliance and effectively mitigate air pollution from industrial sources.

Keyword - Air Pollution, Industrial facilities, Laws

I. INTRODUCTION

Thailand is renowned for its beautiful natural landscapes, including mountains, seas, and waterfalls, which are unique features of the country that significantly contribute to its tourism industry. Both Thai and international tourists frequently travel to Thailand to experience its natural beauty. However, as time has passed and the human population has increased, the number of industrial factories has also risen [1]. Some of these factories lack proper pollution control measures and discharge waste into the environment, causing both water and air pollution. For example, on April 3, 2023, officials from the Industrial Waste Management Division conducted an analysis of a thick black liquid with a strong chemical odor. The analysis revealed an extremely high level of acidity with a pH value of 0-1, classifying it as a hazardous chemical waste under Type 3 hazardous substances, in accordance with the Hazardous Substance Act B.E. 2535 (1992) [2]. Furthermore, water samples from an adjacent irrigation canal showed a neutral pH value of 7. This incident was related to the illegal storage of approximately 4,000 tons of hazardous chemical substances inside a warehouse in PhachiDistrict [2]. Additionally, data from 2022 indicated that the average concentration of airborne particulate matter (PM 2.5) caused by industrial pollution in Bangkok and its metropolitan areas reached 31 $\mu g/m^3$, marking a 15% increase from 2021 [3]. Air quality measurements showed that ozone levels did not exceed 100 ppb in one-hour measurements and remained under 70 ppb in eight-hour averages. Nitrogen dioxide levels were measured at no more than 170 ppb in one hour and averaged no more than 30 ppb annually. Sulfur dioxide levels did not exceed 300 ppb in one-hour measurements, with an annual average of no more than 40 ppb. Carbon dioxide levels were measured at no more than 30 ppm in both one-hour and eight-hour monitoring periods. Despite Thailand having existing environmental legislation such as the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992), the Factory Act B.E. 2535 (1992), and the Public Health Act B.E. 2535 (1992), which are intended to regulate the discharge of wastewater into public waterways and the broader environment, violations still occur [4]. These laws tend to be limited in scope, lack comprehensive coverage, and are unclear in their enforcement, leading to ongoing noncompliance. The consequences of such pollution are far-reaching, affecting factory workers, nearby communities, and the wider environment. Pollution disperses to various areas, causing harm to living organisms, posing health risks, disrupting ecosystems, and negatively impacting the country's economy

Therefore, the issue arises as to what measures should be implemented within Thailand's legal framework to address and reduce the offenses committed by industrial factories.

II. LITERATURE REVIEW

A. Relevant Definitions

The term pollution originates from the English word "Pollution," derived from "Pollute," which means causing pollution or a polluted state. Pollution can result from human intentional or unintentional

actions, leading to environmental degradation. Pollution exists in various forms, including water pollution, air pollution, soil pollution, waste pollution, noise pollution, food pollution, and radiation pollution, among others. Pollution refers to environmental conditions affected by physical, chemical, or atmospheric changes that pose risks to living organisms and property [5]. Environmental pollution refers to an environmental imbalance caused by toxic substances that are hazardous to humans, plants, and animals [6].

Air pollution, derived from the English term "Air Pollution," refers to contamination of the air with pollutants or foreign substances in significant amounts, occurring in both enclosed and open areas. This deterioration in air quality poses risks to humans, animals, plants, and property, as defined by the World Health Organization (WHO). Air pollution arises from multiple sources, including smoke, motor vehicle emissions, and—most notably in this context—industrial air pollution. Industrial air pollution is primarily caused by two major factors: 1. Combustion of fuels for energy production within industrial facilities., and 2. Use of chemicals in industrial production processes [7].

Industrial processes release air pollutants due to fuel combustion, leading to toxic gases and fine particulate matter that are often invisible to the naked eye. If airborne pollutants accumulate in high concentrations over extended periods, they can severely impact the health of individuals who inhale them.

B. Effects of Air Pollution

Air pollution affects human health by introducing harmful substances into the respiratory system. Inhalation of polluted air can lead to diseases such as pneumonia, bronchitis, nasal and skin irritation, headaches, and nausea. Long-term exposure over several years may result in severe conditions, including heart disease, cancer, and damage to the nervous system, brain, liver, or other organs. Each year, nearly 2.5 million people worldwide die from air pollution-related causes [8]. The impacts of air pollution can be categorized as follows: 1. Effects on human life and health – Prolonged exposure to high concentrations of air pollutants can cause respiratory diseases such as chronic bronchitis, emphysema, and certain types of cancer. Additionally, it may lead to psychological distress, irritability, and mood disturbances. 2. Effects on natural resources and agriculture – Air pollution can harm plants, causing leaves to lose their color or turn yellow due to the destruction of chlorophyll. A deficiency of essential nutrients in plants can negatively impact herbivorous animals, leading to illness or fatality. 3. Effects on the economy and society – Air pollution affects agricultural yields, depletes natural resources, and degrades soil fertility. Rising temperatures and weakened plant resistance increase agricultural costs, while reduced crop yields lead to declining market prices. Certain regions may experience reduced agricultural productivity, and 4. Effects on climate change – Greenhouse gases, including carbon monoxide, carbon dioxide, methane, and nitrogen oxides, contribute to the greenhouse effect, leading to rising global temperatures. This results in rising sea levels, severe flooding, deforestation, and the extinction of species unable to adapt to climate changes [9].

C. Criminal Liability of Industrial Factories for Air Pollution

Criminal liability under Thai law includes penalties such as capital punishment, imprisonment, detention, fines, and asset confiscation. In environmental cases, penalties typically involve imprisonment or fines, while asset confiscation applies to offenses involving illegal property. Detention is used when the offender is unable to pay fines, and courts impose appropriate penalties at their discretion [10]. The National Environmental Quality Promotion and Preservation Act B.E. 2535 (1992) establishes criminal liability measures for individuals who damage the environment or fail to comply with legal requirements. Additionally, the Factory Act B.E. 2535 (1992) imposes penalties on offenders, including property-related sanctions. Under Section 98 of the National Environmental Quality Act, maximum imprisonment terms are prescribed, but there is no minimum sentence. In most environmental law cases, fines are more commonly imposed than imprisonment.

D. Laws Related to Pollution

The National Environmental Quality Promotion and Preservation Act B.E. 2535 (1992)

This law aims to promote and preserve environmental quality in Thailand by setting pollution control and prevention measures, including those related to air pollution from various sources such as industrial factories and vehicles. The provisions related to air pollution include: 1. Environmental Standards as per Section 32 – The Pollution Control Department has the authority to set air quality standards, including atmospheric pollution and emissions from sources. 2. Pollution Source Control as per Section 34 – The Minister of Natural Resources and Environment has the power to regulate emissions from pollution sources such as industrial factories, power plants, and open burning. 3. Pollution Crisis Management as per Section 59 – If pollution levels exceed standards and pose risks to public health and the environment, the Minister can declare the area a pollution control zone with special pollution reduction measures, and 4. Environmental Impact Assessment (EIA) as per Sections 46 and 47 – Largescale industrial operations that may

significantly impact the environment must conduct an EIA to evaluate and mitigate their environmental effects. Relevant agencies include the Pollution Control Department, the National Environmental Board, and local administrative organizations. Regarding penalties for violations, Section 96 states that individuals who fail to comply with pollution control measures may face imprisonment of up to one year, a fine of up to 100,000 baht, or both. Under Section 97, polluters are responsible for the costs of environmental restoration.

The Factory Act B.E. 2535 (1992)

This law establishes regulations and measures for controlling industrial factories in Thailand, focusing on preventing and mitigating environmental impacts from production processes to protect public welfare. Violations of this law result in administrative, civil, and criminal penalties. The key provisions include: 1. Factory Operations Control as per Section 7 – Regulates the establishment and operation of factories. 2. Pollution Inspection and Control as per Sections 36 & 37 – Mandates factory inspections to ensure compliance with environmental and safety standards. 3. Emission Standards as per Section 8, Subsection 2 & Section 32 – Set limits on industrial emissions to prevent environmental degradation. 4. Compliance Reporting as per Section 39 – Requires factories to submit periodic reports on environmental compliance. 5. Penalties for Violations as per Sections 42 & 43 – Imposes a fine of up to 200,000 baht or imprisonment for up to 2 years. Factories causing pollution that significantly affect health or the environment may face closure or license revocation. Section 57 of the law specifies fixed fines, which lack flexibility as they do not account for inflation or evolving economic conditions, making environmental penalties disproportionate to the actual social and environmental damage.

The Public Health Act B.E. 2535 (1992) (Amended in B.E. 2550 (2007))

This law plays a crucial role in managing pollution from industrial factories, particularly when it affects public health or creates nuisances. It empowers local authorities and public health officials to address pollution issues effectively. Key provisions include: 1. Protecting Public Health – Regulates industrial pollution that may pose health risks. 2. Local and Public Health Authority Powers – Grants local agencies the authority to prevent and mitigate public health nuisances caused by pollution. 3. Supporting Other Environmental Laws – Works alongside the Factory Act B.E. 2535 (1992).

E. Air Pollution Control Measures in Foreign Countries

Japan

Japan, like Thailand, has a strong agricultural sector, but its environmental policies have been shaped by industrial pollution incidents. One of the most notable cases was cadmium pollution in Toyama Prefecture, which caused Itai-Itai disease, and the Minamata disease outbreak in Kumamoto Prefecture due to mercury poisoning from industrial waste. As of September 2006, Minamata disease had resulted in 6,500 deaths [11]. To address such crises, Japan enacted the Law for the Punishment of Crimes relating to Environmental Pollution which adversely affects the Health of Persons, which protects human health and ecosystems. If pollution results in severe bodily harm or death, offenders can face up to 7 years in prison or a fine of up to 5 million yen [12]. Additionally, Japan introduced the Smoke and Soot Law 1962, later revised into the Air Pollution Control Law of 1968, and the Basic Environmental Pollution Control Law, 1967, which established environmental liability and emission standards. These were further revised into the Basic Environmental Law, 1993, significantly improving air pollution control.

United States of America

The United States has a long history of air pollution legislation, starting with the Air Pollution Control Act of 1955, which has undergone several amendments in 1963, 1967, 1970, 1977, and 1990. The Clean Air Act of 1990 granted the federal government authority to impose fines of $25,000 per day for violations, up to a maximum of $200,000 (approximately 6,911,500 THB as of November 25, 2024). The law focuses on four key areas: acid rain, urban air pollution, emission control, and ozone layer protection [13]. Additionally, the National Environmental Policy Act of 1969 was enacted to protect the environment and improve ecological awareness. These legislative measures have played a crucial role in reducing air pollution and mitigating environmental impacts in the U.S.

III. ANALYSIS

The study finds that while Thailand has multiple laws regulating air pollution from industrial factories, enforcement remains ineffective due to penalties that do not correspond to the actual damage caused. Data from 2022 indicate that the average level of air pollution from industrial emissions in Bangkok and its metropolitan areas increased by 15% compared to 2021. In contrast, Japan has implemented strict laws regulating industrial emissions, including penalties for polluters under the 1968 Air Pollution Control Law, aimed at protecting public health and conserving ecosystems. Similarly, the United States has amended its air pollution laws to impose severe daily fines on violators, deterring industrial pollution through financial penalties that increase with continued violations.

IV. SYNTHESIS

Thailand's industrial sector lacks strict control over hazardous gas emissions, leading to serious health consequences such as pneumonia, Itai-Itai disease, and asthma. The country currently enforces environmental protection through laws such as the 1992 Environmental Quality Promotion and Preservation Act and the 1992 Public Health Act. However, Section 57 of the Factory Act prescribes fixed fines that do not adjust for inflation and do not proportionally reflect the societal damage caused by pollution. In contrast, Japan was the first country to introduce criminal penalties for air pollution, while the U.S. has continuously updated its laws to impose significantly higher fines, ensuring that penalties act as an effective deterrent. Unlike these countries, Thailand's relatively low fines may fail to discourage industries from violating environmental laws.

V. CONCLUSION AND FUTURE WORK

This study concludes that Thailand's penalties for air pollution violations are insufficient compared to stricter laws in the United States and Japan. To enhance enforcement effectiveness, it is recommended that Thailand revises its legal framework to impose higher fines and stricter penalties, ensuring that they align with current economic and social conditions. Strengthening legal deterrents can significantly reduce industrial air pollution and improve environmental protection.

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REFERENCE

[1] AdisornNapawaranon. (2004). Environmental Management in the Industrial Sector. King Prajadhipok's Institute Library, pp. 1-2. Retrieved on November 15, 2024, from https://kpi-lib.com/multim/ebook2/ปรม3บ525.pdf.

[2] Department of Industrial Works. (April 3, 2023). Outrageous! No Fear of the Law!! Another Case of Illegal Chemical Waste Dumping Found in KhokMuangSubdistrict, Phachi District, PhraNakhon Si Ayutthaya Province. Retrieved on November 15, 2024, from https://www.diw.go.th/webdiw/pr66-212/.

[3] Pollution Control Department, Ministry of Natural Resources and Environment. (2024). Thailand Pollution Situation Report 2023. Retrieved on November 19, 2025, from https://www.pcd.go.th/wp-content/uploads/2024/06/pcdnew-2024-06-27_07-41-54_220443.pdf.

[4] EkachaiLuangwijit. (2005). Development of an Environmental Impact Assessment System in Thailand. Master's Thesis, Chulalongkorn University, pp. 8-11.

[5] ThanyaphakSangkamon, Rajamangala University of Technology Isan. (n.d.). Definition and Impact of Environmental Pollution. Retrieved on November 25, 2025, from https://www.rmuti.ac.th/user/thanyaphak/Web%20EMR/Web%20IS%20Environmen%20gr.4/Intro1.html.

[6] KasemChankaeo. (2004). Science and Environment. 6th Edition. Bangkok: Kasetsart University Press, p. 225.

[7] Ora-usa Prom-od &ChayadaJirakittithawon. (January 3, 2024). Industrial Factories: Another Cause of PM 2.5. Policy Watch. Retrieved on November 25, 2024, from https://policywatch.thaipbs.or.th/article/environment-5.

[8] Health &Envitech Co., Ltd. (August 23, 2024). What Are Air Pollutants and How Do They Affect Health? Retrieved on November 31, 2025, from https://healthenvi.com/how-air-pollution-affects-health/.

[9] KornkamolChuchuay. (n.d.). SCC3301 Environmental Science: Causes of Pollution and Environmental Impacts. Faculty of Science and Environment, SuanSunandhaRajabhat University, pp. 71 -75. Retrieved on December 26, 2025, from https://eledu.ssru.ac.th/kornkamol_ch/pluginfile.php/558/mod_resource/content/1/บทที่%204%20สาเหตุของมลภาวะและผลกระทบต่อสิ่งแวดล้อม.

[10] pdf?utm_source=perplexity.

[11] Anan Likhittanasombat. (2014). Criminal Sanctions for Environmental Offenders. Electronic Library of the Court of Justice, pp.

[12] 7-8. Retrieved on January 8, 2025, from https://library.coj.go.th/pdf-view.html?fid=1552&table=files_biblio&utm_source=perplexity.

[13] East Asian Studies Institute under the Royal Patronage of Her Royal Highness Princess MahaChakriSirindhorn, Thammasat University. (n.d.). Environmental Management in Japan and South Korea: Guidelines for Thailand – A Case Study of Urban and Community Environmental Management. Thammasat University Press, pp. 8-9.

[14] NuntawanLumduwong. (2019). Legal Measures on Criminal Liability for Negligence of Polluters under the Enhancement and Conservation of National Environmental Quality Act B.E. 2535 (1992). Master's Thesis, Burapha University, pp. 42-45.

[15] ChayadaJirakittithawon. (January 11, 2024). Dust Pollution Policies: U.S., Japan, China. Policy Watch, p. 46. Retrieved on January 8, 2025, from https://policywatch.thaipbs.or.th/article/environment-8?utm_source=perplexity.

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