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2. To support academicians and teachers in creating work beneficial to the academic community
3. To stimulate and support education at the university level

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Editorial Note

The Interdisciplinary Research Review (IRR) was established with academic cooperation by the Nakhon Pathom Rajabhat University, The Royal Society of Thailand Committee of Interdisciplinary Research and Development, Rajabhat University (Western Group), and Rajamangala University of Technology Rattanakosin. This Issue, Volume 17 Number 6 (November – December 2022). This issue contains of four interesting articles in multidisciplinary fields: (1) Assessing street greenery using imagery of Google Street View, (2) The process of teaching and learning to create students' identity, (3) Local government involvement in post-pandemic development initiatives for the Lao Khrang Ethnic Group of Nakhon Pathom Province, and (4) Bachelor of Technical Teacher Education versus Bachelor of Technical-Vocational Teacher Education: A comparative analysis of technical teacher education curricula.

The Editorial Board of the IRR encourages anyone to submit articles for evaluation and review. The processes of submission, review and publication of articles are described on the journal's website, https://www.tci-thaijo.org/index.php/jtir. The Editorial Board and Committees of the IRR sincerely thank all peer reviewers who have sacrificed their time to help us produce a better journal, and also wish to thank all teachers, researchers and other academicians for submitting their valuable research to this journal. Finally, we thank readers of our journal who help to spread the knowledge and benefits gained to others. With your feedback and suggestions, we will strive to improve the quality and relevance of the IRR.

Yongyudh Vajaradul
Editor
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State Liability in Administrative Lawsuits due to Flood Damage and Climate Change

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Abstract

Climate change has triggered disruptive impacts globally and exacerbated the magnitude and frequency of floods. Scientists around the world point to climate change as not only the major cause of elevated flood water levels on both state and private lands, but also intensity and frequency of flooding, subsequent sedimentation and erosion. States may aggravate flood damage by neglect the climate change and not taking adverse climate change impacts into account in their programs and policies. The UNEP Global Climate Litigation Report (2020) disclosed that rapid increase in climate litigation has occurred around the world, e.g., in 2017, 884 lawsuits in 24 countries and in July 2020, total cases have approximately doubled with about 1,550 climate change lawsuits in 38 countries. The dramatic increase in climate lawsuits is pressuring much-needed change. In Thailand, flood affected people have filed administrative cases of state liability through administrative disputes under Section 9 Paragraph one of the Act on Establishment of Administrative Courts and Administrative Court Procedure, B.E. 2542 (1999). The factual and legal problems of state liability in Thailand still need to be developed. The article disclosed not only the causes and problems of flooding including climate change impacts, but also international and Thai conceptual ideas of state liability due to flood damages exacerbated by climate change. Therefore, state liability disputes of Chao Phraya flood damage cases were analyzed in order to propose guidelines for solving administrative disputes in an efficient and fair manner to both plaintiff and defendant, without burdening to state budgets and minimizing social conflicts in the future.

Keywords: State Liability, Flood Damage, Climate Change, Thai Administrative Court

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1. Introduction

Scientific consensus has depicted the existence of climate since a century ago, as scientific researches have evidenced that human activities (exploitation of fossil fuels) have warmed up earth and ocean (Fig.1), which in turn adversely affect the climate change [1]. Global temperature has risen as a long-term trend and then grown with steep slope from year 1980 up to now.

Warmer climate exacerbates flood risk which may induce more severe rainfall events, more frequency and magnitude of flood [2,3,4]. Government agencies may exacerbate flood damage through neglect anticipating climate change and not taking adverse climate change impacts into account for their plans or policies. UNEP Global Climate Litigation [5] reported that high increase in climate litigation has occurred around the world, e.g., in 2017, 884 cases sued in 24 countries and July 2020, total cases have approximately doubled to about 1,550 climate change cases sued in 38 countries. But Administrative Court in Thailand has not yet held any government agencies liable for damages. There is a failure to respond to climate change in their plans or policies resulting in escalation of flood damages. Nevertheless, Thai Administrative Court has normally held government agencies liable in dispute cases relating to traditional flooding. Furthermore, the factual and legal problems of state liability in Thailand still need to be developed in order to be more effective and fairer to both parties. Finally, some principles from foreign countries will be proposed for improving state liability concept for damage of flood and climate change in Thailand.

2. Causation of Flood and Climate Change in Chao Phraya River

The most important river of Thailand is Chao Phraya River, regarded as the main blood vein to feed the hub of Thai economy, i.e., Bangkok, its vicinities and prime paddy field areas of Thailand, while riparian people have often encountered the flood and some have sued government agencies for compensation. Therefore, the state liability of Chao Phraya flood damages was selected for analysis in this paper. However, the causation of flood and climate change in Chao Phraya River must first be explained. Chao Phraya River basin encompassed 160,000 km2 or 30%

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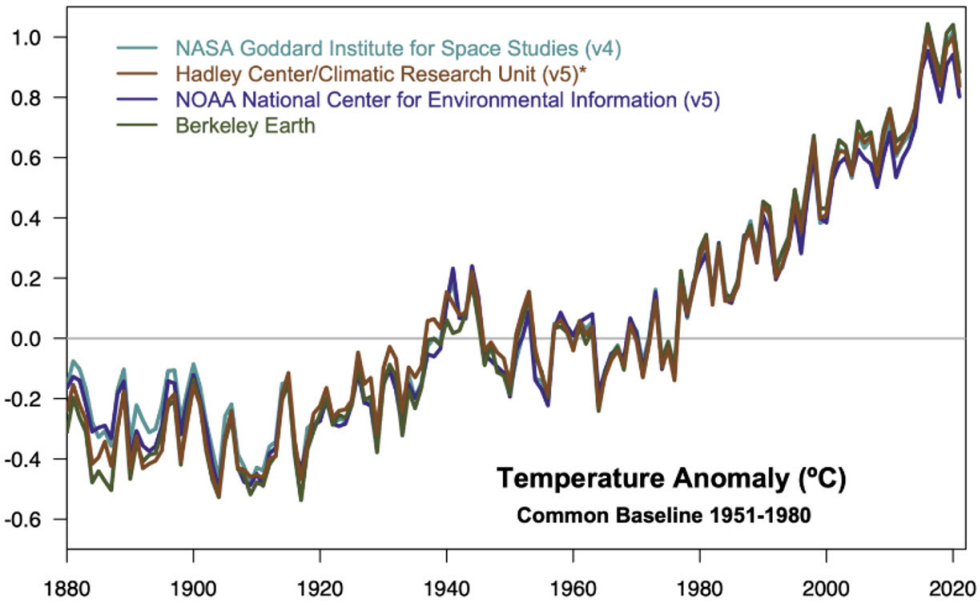

Figure 1: Global Temperature Anomaly during years 1880 – 2020 adapted from [1].

of total size of Thailand (Fig.2). The basin is divided into 2 sub-basins, namely, Upper Chao Phraya River Basin – composed of Ping, Wang, Yom and Nan Rivers and 4 major reservoirs, namely, Bhumibol, Sirikit, Kew Lom and Kwae Noi reservoirs with total store volume of 25.7 billion m3 . While the Lower Chao Phraya River Basin is demarcated by Nakhon Sawan Province. The Sakrae Krang tributary comes to join at the right bank of Chao Phraya River between Nakhon Sawan and Chao Phraya Dam. The lower basin is rather mild slope – its river bed slope is about 1/10000 to 1/15000in which Chao Phraya River flow is managed by Chao Phraya Dam, Chainat province. Geographically, river flow continually increased along downstream side where river tributaries come to conjugate Chao Phraya River, but river drainage capacity at downstream is insufficient due to land-use change, structures blocking, intruding in water ways or others. Due to these reasons, continuously cumulative flood from upstream – steep slope and high altitudes flow down to elevate the flood water levels in downstream and then inundate and disperse over the flood plains downstream on both banks of the river. The problem was perhaps aggravated by mismanagement of the flood [7] or suspected politically motivated manipulation. In the past, Chao Phraya River was manageable, but climate change has played important role to exacerbate flood in Chao Phraya Basin.Typically, big floods were due to typhoons during the wet season between August to December, with a total of 19 recorded big floods in recent decades, e.g., 1994, 1995, 1996, 2011 and 2021. The extreme year-2011- Chao Phraya River basin flood was the worst and most damaging ever recorded in history [6,7,8,9], as this flood directly affected 13 million people, caused more than 800 deaths [8] inundated over 7 industrial estates and inflicted total economic losses of about 38.71 billion USD.

Previous studies disclosed that climate change has played vital roles in Chao Phraya Basin and will induce 4 - 5 % more rainfall in 2050, increase the flood flow about 6.8 – 41.9% of referenced period of 2003 to 2011 and rise the sea water level at maximum of 28.9 cm in 2049 [10,12,13,14].These scientific evidences confirm that the climate change will affect to flood in Chao Phraya River more severely and frequently.

3. Causation of Flood and Climate Change in Chao Phraya River

State liability principle originated from the legal maxim that the King can do no wrong [15], as Thai state in the past was governed by absolute monarchy regime and thus to sue the king, government units or officers who deemed to act on behalf of the King have no liabilities to the person aggrieved from administrative proceeding [16]. Now, Thailand has developed the principle of state liability, i.e., the state or administrative officers have liability due to their act causing damages to people. This conceptual idea aimed to comply with the principle of ensuring rights and liberties of the people, control of administrative act by legality, legal state and state liability [17]. Later on, Act on Tortious Liability of Officials, B.E.2539 was enacted and enforced, then Thai state grounded the many principles of Tortious Liability of Officials, e.g., an administrative official is only liable, if an official perform duty according to the law and causes damage to others intentionally or with gross negligence, deducting state liability and not applying joint obligation principle.

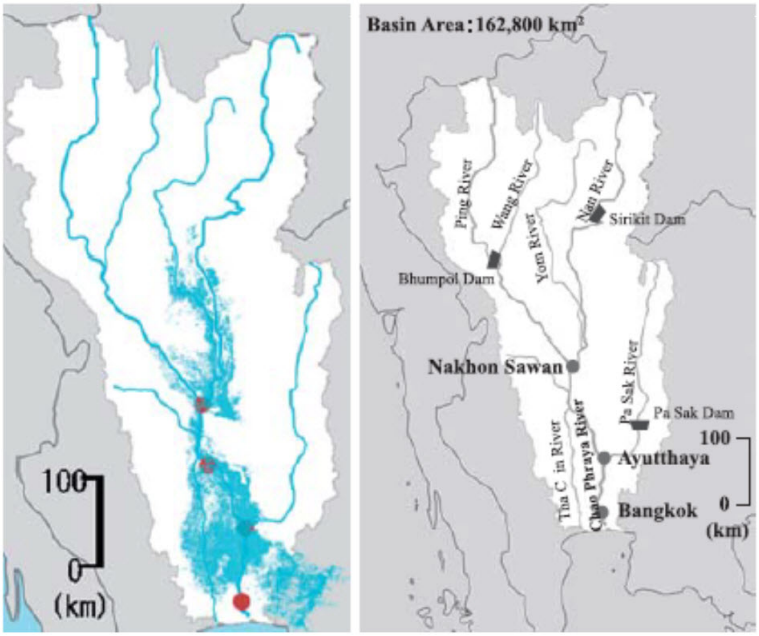

Figure 2: 2011 flood inundation area (Left) and flow diagram of Chao Phraya River basin adapted from [6]

According to the Supreme Administrative Court verdicts on disputes of flood inundation or flood management in Chao Phraya Basin, the state's liability for damage from those disputes in the Chao Phraya Basin was mostly sued for the administrative dispute under section 9 paragraph (1), (2) and (3) of Act of the Establishment Administrative Court and Administrative Court Procedure, B.E. 2542 and Act of Tortious Liability of Officials, B.E. 2539. The verdicts review of Administrative Court expressed that state liability of Thai legal system, Administrative Court trendily sentenced the state or administrative liability, if action by state or administrator cause damage to people by conforming to tort liability principle or unlawful act [16]. Foreign legal system has continually and long-lasting developed the concept of state- or administrative liability which in turn been divided into two categories, namely, (1) the tort liability and the (2) liability without fault. As mentioned above, Thai Administrative Court tended to apply the tort liability concept for state- or administrative liability rather than applying concept of liability without fault. This might be reasoned that tort liability principle in Thailand has been developed longer than principle of liability without fault and no criteria or law to consider in details which case of state or administrative officials to hold liability without fault. Furthermore, the Thai legal system relies strictly on written law. As a result, the court may not be familiar to raise such liability principles to use in the trial.Although, the section 9 paragraph one (3) of Act of the Establishment Administrative Court and Administrative Court Procedure, B.E. 2542 already legislated "liability without fault" and this legal provision thus is an opportunity for Administrative Court to develop the liability principle of state or administrative without fault, but few administrative cases have, up-to-now, been applied the principle of liability without fault.In some cases, their factual disputes were nearly similar, but their verdicts were completely different, such cases may therefore cause unfairness to the people who have been burdened unreasonably or damaged by the proceeding of administrative [16].This led to no comply with legal security principle (Le principe de sécurité juridique) of judgement[18].

4. State Liability Principle of Foreign Countries

4.1 State Liability of French Republic

As was addressed in Blanco, the French law on the state liability is not complied on the Civil Code, but depended on legal principles developed by the courts and on particular rules based on statute in relation to specific activities [19]. Theory of state liability of French Republic was grounded by Blanco in 1873 stated that "Whereas the liability which may be incurred by the state for the loss caused to individuals by the actions of persons whom its employees in the public service cannot be governed by the principles laid down in the Civil Code to regulate the legal relationships of individuals" [19]. Duguit proactively founded the basis of the state liability was 'the idea of social insurance provided by the central budget and compensating those who have suffered a loss arising from public services . . . thus if the intervention of the State creates a special loss for some people, the Government must compensate it, whether there is a fault of the public officials or not [20,21].State liability of French legal system has three significances, namely (1) the state liability exists in both private and public law, (2) liability exists for both the private liability of

public officials when acting on their own and the state liability when providing public services. The liability ,therefore, depends on whether the fault is a personal fault (Faute personnelle), a fault of public official performing his duty (Faute de service) liability mixing between a personal fault or a fault of public service or so called "combination of responsibilities" (Le cumul des responsabilités) and (3) the parallel existence of liability for fault and liability without fault, originally the liability of the state was the liability for the fault, but later on, French Administrative Court has developed the principle of liability without fault to supplement it to achieve more fairness [22].

4.2 State Liability of Republic of Germany

Staatshaftung is state liability in German. In German legal system, state liability is commonly the liability of the state and other public agencies for damages in the course of performing official duties [23]. German state liability needed to demarcate two important distinctions, i.e., (1) a first distinction must be depicted between the personal liability of the official and the liability of the relevant administrative agencies or the State for its public services and (2) the second and even more significant distinction is between lawful and unlawful acts of officials or administrative agencies. The state is liable for two categories of acts though under different conditions. As a rule, liability occurs with unlawful act, but in some cases even lawful act is liable [24]. Liability due to unlawful State acts can originate from four disputes. First, personal liability of officials (Beamtenhaftung) governed by statute (§839 Bürgerliches Gesetzbuch, Civil Code – BGB). The provision used regardless of persons acted in the public domain or private interest of that official (Acta iure gestionis and acta iure imperii). Second, liability for acts of state employees that result in private damage (provisions of §§31, 278, 831 BGB). Third, state liability for unlawful acts of its officials in the public service: this is governed by art 34 Grundgesetz (Basic Law, GG). By this provision, which is the heart of administrative agencies liability, personal liability of the official for Acta iure imperii is replaced by state liability; the victim has no claim against individual official. However, State may claim redress against the official if the latter acted with intent or grave negligence. Fourth, if the state unlawfully impaired property rights of people, the courts have developed a right to compensation (Haftung ausenteignungs gleichem Eingriff – liability for an expropriation-like intervention).

5. State Liability due to Flood Damage and Climate Change

Human activity has had a dramatic impact on the climate change. Carbon dioxide (CO2) concentrations have escalated rapidly to more than double pre-industrial levels. Those atmospheric changes have induced global warming that, in turn, has led to a range of other adverse impacts including melting glaciers, vanishing snow cover, decreasing sea ice, rising seawater levels, acidifying oceans, mass migration and displacement, higher frequency and heavy precipitation, severe flood, forest fires, and record-breaking temperatures [5].Due to these scientific facts and adverse impacts, plaintiffs and petitioners pursuing to compel more climate change mitigation and adaptation on the governments and private parties have brought a wide range of climate change cases before tribunals throughout the world. These cases have applied to compel governments to speed their attempts to implement emissions reduction targets; illustrate that national Green House Gas (GHG) emissions goals are insufficiently or not being proceeded at all; link harms suffered by vulnerable communities to emitters liable for a share of global temperature increases; take global climate change concerns to proceed on local action; and either force adaptation action or recover losses that result from others' failures to adapt.These cases are important for defendants, i.e., suing governments on climate cases result in binding judicial orders that desire new climate goals, broader climate regulations, reforms to environmental impact assessments, important investments in social and physical infrastructure and other procedures. Recently, states sued for environmental consequences of failing to adapt their facilities or operations may be at risk of significant liability, e.g., the case of Administrative Court of Paris in 2021 judged and ordered the PM and competent ministers to take all useful measures to remediate the worsen impacts of climate change and pay compensation for plaintiffs [25].

Litigation relating to flood damage and climate change for the whole world, of that more than half are lawsuits in USA [5], hence state liability due flood and climate change in US common law system are more advanced than other countries. The relevant litigation theories described here can be adapted towards Thai Administrative legal system. Noted that Civil law system is adopted in Thailand, but US system can have relevancy to Thai situation esp. in these aspects: Public and Private Nuisances, Negligence, Trespass, Violation of Riparian Rights, the Law of Surface Waters, Strict Liability, Denial of Lateral Support, Statutory Liability and Inverse Condemnation [26].

5.1 Public and Private Nuisances

Sometimes, administrative agencies may be sued through common law nuisance, if their acts lead to increasing flood hazards or land erosion by state activities on private lands. In common law system, nuisance may be either "public" or "private", i.e., no landholder has a right to utilize his or her land in a way that tangibly interferes, in a physical sense, with the exploitation and enjoyment of other lands, e.g., Sandifer Mo-

tor, Inc. v. City of Roeland Park [27], flooding caused by city dumping wastes into ravine that clog the sewer system. This lawsuit was a nuisance. Public or private nuisance pertains to interference with right to use of land and is hence more serious than "negligence". In climate change lawsuits, administrative agency activities may aggravate natural hazards damage and may subject to public or private nuisance suits but not restricted to the inadequate design, construction, operation, and maintenance of channelization works, dikes, dams, levees, culverts, bridges, highways, groins, and sea walls, e.g., in 2003, the California Court of Appeals upheld a damage compensation against the State of California for flood damages [28]. The total settlement in this suit was $464 million dollars.

5.2 Negligence

State, both public and private landowners have long had an obligation to exercise "reasonable care" in their actions in order to avoid injury to others. As stated in The US Law of Torts, 5^{th}ed. (1984) at p. 169, unlike nuisance and trespass which involve damages to land, negligence is wider consideration and uses to many types of activities including but not restricted to damages to land. Negligence provides a principle for flood-related lawsuits including climate change-related suits. It is the prime legal theory related state liability for traditional flood hazards originated from inadequate construction and maintenance of hazard reduction measures, e.g., flood control structures, improperly prepared declaration of warnings, unlawful processing of permits, and insufficient inspections. Abundant scientific facts of climate change effects [1,2,3,4] indicate that flood magnitude and frequency will escalate more than mean situation and damage to private assets. As these consequences come about, states will be liable for damages for failing to consider climate change in their flood measures in the near future.

5.3 Trespass

At common law, landowners may also conduct trespass actions for certain types of public and private encroachments of private property such as flooding or drainage. Principal activities which may be sued for trespass in climate-related contexts are similar to nuisance suits.

5.4 Violation of Riparian Rights

Riparian rights or "privileges" of landowners include fishing, swimming, and construction on river bank but must "reasonably" be exercised in relation to other riparian landowners. With this principle, courts have held that construction of levees, dams, etc. by government or private riparian landowner which increases flood losses on other riparian lands constitute a violation of riparian rights. Similarly, failure to reasonably exercise consideration that led to flood exacerbating due to climate change may also constitute a violation of riparian rights.

5.5 The Law of Surface Waters

Under the rule of "reasonable use" for "surface" water used by common law courts in most US states, landowners may not block the flow of widespread surface waters, enormously exacerbate that flow, or increase flow channel to a point other than its natural discharge. Courts have usually adopted the rule of "reasonable use" applicable to public as well as private land. But there are some differences. For example, a Minnesota court held that a community could not claim "reasonable use" as a defense to a "taking claim".

5.6 Strict Liability

Courts, in most states, have held that landowners and administrative agencies are "strictly liable" for the break of dams or levees if they cause flash flood or movement of enormous water mass. Following an early English ruling, private and public landholders are liable for losses from ultra-hazardous effects even if no negligence is related. Losses to landholders by climate change-related flooding and erosion from the break of a dam or levee could claim strict liability by the state to such damages or, at a minimum, that State's failure to adequately anticipate such flooding is deemed as negligence.

5.7 Denial of Lateral Support

The right of lateral support [29] is a common law principle that landholder has a right in having their soil in its natural condition remain in its natural position without any change by excavations, improvements made or other activities on adjacent land. Erosion originated by climate change in the construction or maintenance of roads, bridges, buildings, and other public works may deny lateral support to adjacent lands causing land failures, e.g., landslides, mudslides, erosion, and building collapse.

5.8 Statutory Liability

Some states have utilized statutes which separate statutory grounds for flood and erosion-related lawsuits. In Texas, Texas Water Code, article 7589a (Act of 1927) makes it unlawful to divert the natural flow or to store surface waters in ways that harm property of others. These statutes could, at least in part, ground the basis for lawsuits suing that administrative units have exacerbated or failed to forecast climate-related flood damages.

5.9 Inverse Condemnation ("Taking" Without Payment of Just Compensation) Due to Flooding of Private Lands

Inverse Condemnation is a legal term adopted in the law to explain a situation in which the administrative agencies take private property, but fails to pay the appropriate compensation required by the 5th Amendment of the Constitution - stated that the government shall not take private property for public use without paying just compensation. So the property owner must sue to receive the required fair compensation. Ingram v. City of Redondo Beach [26] is an example, in which the court made the verdict that brake of an earthen retaining wall maintained by the city with causing flooding was principle for an inverse condemnation suit. Inverse condemnation actions for destruction of private property owing to increased natural hazards resulted by government activities have been admitted in many states

6. Analysis of Problems of State Liability in Administrative Cases of Flood Damage in Chao Phraya River

6.1 Problem to consider whether the occurring flood is a disaster or not.

At the time of writing (B.E. 2566), no act or law exists that specify definition of flood term. This may lead to problems in court when deciding whether a flood is classified as traditional flood or disaster flood.

6.2 Problem of Standing.

Or locus standi, as stated on section 42 of Act of the Establishment Administrative Court and Administrative Court Procedure, B.E. 2542 and the order of the supreme Administrative Court no. 247/2552 states about standing to Administrative Court, i.e., a natural person, juristic person or a community as a right holder may file under administrative lawsuit. However, for the community or group to sue under administrative lawsuit, they must clarify the aim or duty of community or group and how these are linked in the lawsuit dispute.

6.3 Problem of finding qualified person to exercise discretion, to read and to consider evidence.

Currently, Administrative Court face problems of lacking qualified persons to offer their expert opinions and consideration. Since Administrative Court, up-to-now, does not disclose the list of relevant experts as in the Court of Justice. Furthermore, the compensation rate for expert in Administrative Court seems to be inappropriate. Flooding or climate change dispute is difficult to understand in terms of adequate scientific explanation. Therefore, the dispute becomes too complex to understand for plaintiffs when defendant clarifies using technical documents. This is a drawback for consideration in any dispute of flood and climate change. So, most listening to evidence in Administrative Court were solely considered from the documents of the parties. If the court considers the plaintiff aggrieved by infringement or liability without fault from the exercise of legal power of the officers as the defendant, the court may make a verdict the defendant must be liable to pay compensation according to the plaintiff's complaint. On the other hand, if the plaintiff or defendant cannot offer evidence to refuse the court to agree otherwise. Mostly the plaintiff is drawback against the defendant - administrative official who hold most scientific evidence in their hand. The Administrative Court may issue a judgment defining the decree upon the available evidences of the parties. Therefore, the verdicts or damages determined by the court may be a problem to consider whether it is really correct or fair to the parties and the society. This problem not only appeared in Thai Administrative Court, but also happened in foreign Administrative Courts in the past [31, 32]. But foreign Administrative Courts have developed legal principles that sustain the fairness to parties and guarantee the adverse effects from administrative proceedings to people as shown in topic no. 4, 5 and some countries proposed a novel component of court's panel, so called "expert judge" [31] in order to secure adequate finding of fact and scientific understanding of disputes, especially environmental aspects, e.g., flood or climate change. These solutions bring indisputable benefits to the legal consideration of Administrative Court.

6.4 Problem of principles to consider the tortious liability.

Which is a part of state liability. In Thai Administrative Court, the court customarily considers the legal components based on section 420 of Civil and Commercial Code whether the violation should be classed as administrative tort. When a dispute of flood management or relevant issue is brought to Administrative Court, Administrative Court firstly consider whether an agency or an official has the legal duty to manage flood. And their legal duty is specified, i.e., their legal duty must aim to protect the rights of people to claim liability from the state. Next, the Administrative Court then consider whether proceedings of the administrative agency or official completely conformed to the legal components of section 420 of Civil and Commercial Code. This leads to a drawback against the petitioner, because defendant - administrative agency or official holds most flood management evidences in their hand as technocrat, but the petitioner lacks deep knowledge or information to defend his/her dispute. Furthermore, Thai administrative court was founded to use the Inquisitorial System, but not Accusatorial System in order to sustain the fairness for unbalanced power between plaintiff – suffered people vs defendant – administrative agency or official. As aforementioned

reasons, most plaintiffs could not clarify to Administrative Court how proceedings of administrative agencies or official action led to flood exacerbation and affected people. Then the verdict to the plaintiffs did not get or get less reparation from the defendants. These principles to consider the tortious liability is not complied to the foreign state liability concepts due to flood or climate change as earlier described in section 4 and 5. These problems can be relieved, e.g., advanced Administrative Court in some countries, they propose the new consideration system to allow permanent expert judge – technocrat in field of water or environmental sciences being a member in the court's panel in order to avoid the aforementioned problems, secure the scientific understanding and sustain the fairness in consideration [31].

6.5 Problem of principles to consider the state liability without fault.

Severe flood in B.E. 2549 and ultra-flood in B.E. 2554, Administrative Courts have consistently aligned the verdicts that the flood management of Royal Irrigation Department in B.E. 2549 and 2554 were proceeded based on the Royal Irrigation Act, B.E.2485. The Act authorizes officials, but the proceedings of officials in flood management resulted in losses to plaintiffs. Thus, these acts by officials did not violate as tort specified in section 420 of Civil and Commercial Code (Supreme Administrative Court Judgment No. .1895/2559). These cases were the state liability without fault; therefore, Royal Irrigation Department has the legal obligation to pay reparations to the suffered plaintiffs due to lawful act of officials (Supreme Administrative Court Judgment No. .1498/2559). These verdicts were conformed partially to the concept of state liability in France, German and USA.

Another dispute stemmed from sandbag use during major Bangkok flood, the governor has built a line of giant sandbags (BIG BAG) as a flood protection dyke to protect flood water entering the inner areas of Bangkok during the flood event in B.E. 2554. Even in the judicial process, it was found that the governor's actions were in compliance with Section 89 (1), (3) and (6) of Bangkok Metropolitan Administration Act, B.E. 2528 which stated that ... providing drainage channels for disaster relief and public order. Therefore, governor's proceeding was then considered a lawful act. But Act of the Bangkok Metropolitan Administration does not specify the rights of affected people to claim the state to be liable for compensation that arose from the lawful act. This may lead to problem whether affected petitioners have the rights to claim the state to be liable or not? When considering the verdicts of judge-commissioner of justice in Red Case No. .128/2557 and the opposing opinion of the minority judge of court's panel in the Red Case No. .658/2559 stated that the proceedings of Bangkok, although is not an act that violated the tort principle, but it appeared to be state liability without fault. Hence Bangkok must be obliged to pay reparation to the plaintiff. These verdicts of cases were complied with the principle of French State Liability, i.e., 'the idea of social insurance provided by the central budget and compensating those who have suffered a loss arising from public services . . . thus if the intervention of the State creates a special loss for some people, the Government must compensate it, whether there is a fault of the public officials or not. Furthermore, this still conformed to a principle of German state liability, i.e., Haftungausenteignungs gleichem Eingriff – liability for an expropriation-like intervention. This was to develop state liability without fault by the Administrative Judge which in turn complied with the principle of Judge-made law.

7. Conclusion

As aforementioned, the article explained how climate change exacerbates and causes severe flood and originates the need for state liability, Causation of Flood and Climate Change in Chao Phraya River, Thai state liability, French state liability, German state liability, state liability due to Flood Damage and Climate Change and problems of state liability in Administrative Cases of Flood Damage in Chao Phraya River, respectively.It unveiled that (1) globally accepted scientific evidences have shown human activities (exploiting of fossil fuels) have warmed up the earth and its ocean, which in turn have adversely impacted the climate change, then exacerbated even more severe floods around the world and finally led to rapidly increasing numbers of state liability around the world, (2) causation of big floods in Chao Phraya River have clearly been due to natural topography, land-use change, floodwater mismanagement and climate change, (3)Thai state liability is not yet conformed completely to the principles of foreign state liability as mentioned above and may need to be proactively developed in the near future, (4) French state liability has been not developed based on the Civil code, but developed by Judge Made Law which in turn guarantee the fairness to the suffered people due to the administrative proceedings whether acts were lawful or not, (5) German state liability has been well aligned the structure of causes of state liability and laid the principle of state liability without fault, so called "Haftung ausenteignungs gleichem Eingriff", (6) U.S. Legal system has been advanced to lay the good legal principles of state liability reasoned from flood damage and climate change. Thus, Thai legal liability system should adapt these principles to be developed for Thai State Liability in the future and (7) Since problems of state liability in administrative cases of flood damage in Chao Phraya River were analyzed above, in short term, discretion problem of complex flood lawsuit is a case involving the judge, which may

require additional knowledge of the judge,as for the problem of lack of experts to give opinions it should be isolated and listed as experts witness issue, while, long term, principles of Thai state liability is needed to be ameliorated by enacting or revising state liability concepts and state liability without fault relied on the state liability concepts of France, Germany and USA by virtue of the Act on Establishment of Administrative Courts and Administrative Court Procedure, B.E.2542, and the Rules of the General Assembly of Judges in Supreme Administrative Court on Administrative Court Procedure, B.E. 2543 and proposing the novel system of the expert judge in Thai Administrative Court's panel as shown in details by [31].

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Cooperation Problems of Criminal Justice Organizations in Addressing Human Trafficking Problems

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Abstract

Thailand has been closely monitored in the issue of human trafficking by the United Nations. Additionally, Thailand has been ranked in Tier 2, indicating that Thai government has struggled to address human trafficking problems. However, this operation has not yet followed the minimum standards of the Trafficking Victims Protection Act (TVPA). Therefore, it is beneficial to study the roles of criminal justice organizations in coping with human trafficking issues, especially cooperation problems of relevant organizations as the main priority. This study is expected to identify effective practice guidelines in solving cooperation problems to upgrade human trafficking problem management to international standards and promote Thailand to be listed in Tier 1 group.

Keywords: Cooperation, Process of Judgment, Human Trafficking

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1. Introduction

Human trafficking is a transnational crime problem. It also violates victims' human rights, substantially damaging their physical and psychological well-being. Human trafficking also poses a danger to ordinary people, the community, and society, which cannot be evaluated in terms of monetary value. In regards to human trafficking in 2014, Thailand was downgraded from the Tier 2 watch list to the Tier 3 watch list, which consists of a group of countries with the worst human trafficking situation. (Annual Report on human trafficking situation in 2014). [1] The Thai government has been making efforts to improve human trafficking. On 30 June 2016.Thailand was moved back to the Tier 2 watch-list group. (Annual Report on human trafficking situation in 2016)[2] This shows that the Thai government was putting significant efforts into eliminating human trafficking during this period even though its operation did not meet the minimum requirements set forth in the Trafficking Victims Protection Act (TVPA). Thailand's placement in Tier 2 indicates that there are still serious issues with human trafficking in the nation despite this development. Therefore, every agency needs to increase efforts and efficiency while being ready to cooperate with the civil sector to suppress human trafficking in Thailand.

Until 2018, Thailand had escalated to the Tier 2 group (not Tier 2 watch list), a group of countries that try to address and investigate human trafficking problems seriously. However, Thailand still showed many mistakes in organization management and justice system, particularly regarding legal aspects and law enforcement. To increase the efficiency and effectiveness in tackling human trafficking in Thailand, increased cooperation, support, and participation between different organizations are needed. However, criminal justice organizations still lack cooperation in addressing the human trafficking problem; it is complicated to solve this problem successfully despite the efficiency of law enforcement. As a result, researchers developed their interest in researching and examining the functions played by criminal justice institutions in combating the problem of human trafficking. This research also focuses on studying obstacles to cooperation within and among organizations. Guidelines to solve the problem of human trafficking in terms of cooperation among organizations and increasing management efficiency are provided.

2. Literature Review

The Provision of Section 6 of Anti-Human Trafficking Act, B.E. 2551 (2008) as amended by the Anti-Trafficking in Persons Act (No.3) B.E. 2560 (2017) states as follows:

Section 6. Whoever does any of the following acts:

(1) procuring, buying, selling, vending, bringing from or sending to, detaining or confining, harboring, or receiving any person, by means of the threat or use

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of force, abduction, fraud, deception, abuse of power, illegal exertion of influence over others on account of their physical, psychological, educational or any kind of vulnerability, threat to take the abusive legal action against others, or of the giving money or benefits to achieve the consent of a person having control over another person in allowing the offender to exploit the person under his or her control; or

(2) procuring, buying, selling, vending, bringing from or sending to, detaining or confining, harboring, or receiving a child;

If such act is committed for the purpose of exploitation, the person who does so is guilty of trafficking in persons.

The exploitation under paragraph one shall mean the exploitation of the prostitution of others, the production or distribution of pornographic materials, the exploitation of other forms of sexual acts, slavery or practices similar to slavery, begging, removal of organs for commercial purposes, forced labour or services, or any other similar forcible extortion, regardless of such person's consent. [3]

A review of legal and legislative frameworks in several nations regarding human trafficking revealed two factors to be taken into account:

Part 1: Structure and operation of the legislation.

Part 2: Identifying the potential to achieve goals, such as spreading of vital information about how laws and regulations should be used in cases of human trafficking to generate shared accountability of the judicial system, coordination and effective communication at domestic and international levels. [4]

The effectiveness of Part 2 is deemed crucial for the elimination and prevention of human trafficking because human trafficking problem is a worldwide issue which requires everyone to plan altogether in order to create operations in relation to its prevention and eradication, such as cooperation and coordination among relevant agencies, assistance to victims, lawsuits, evidence-finding inquiries, and fund collection from various organizations, so human trafficking can be effectively prevented.

However, Thailand hasn't been able to completely eradicate the problem of human trafficking, either, as there are still issues with coordination among corporates that are responsible for the prevention and eradication of this crime. The problems that were noticeable were that:

1. The cooperation system in the judgment proceedings is still unclear; lacking cooperation and consistency;

2. When departmental meetings are held, most participants sent by authorized committees for coordination work do not have the power to decide or give orders within the departments. Therefore, they are incapable of supervising for the purpose of efficient practice;

3. Mistrust among judicial organizations leads to the lack of information exchange;

4. Overall work development in the mission of the judgment proceedings has unclear direction due to a lack of a system to develop strategies and policies in the same direction;

5. There is a lack of a central agency which is responsible for budget allocation to the judgment proceedings, and for follow-up, facilitation, and evaluation of the work performance of subsidiary systems. (Office of Justice Affairs, 2016). [5]

The notion of interorganizational connections that emphasizes environmental management was discussed by Hodge and Anthony. Six categories of cooperation are established: 1) Vertical Integration 2) Horizontal Integration 3) Coalition 4) Interlocking Directorates 5) Reciprocity and 6) Social Interlocking. However, a lack of mutual trust hinders decision-making, limits resources, and causes internal conflicts. They are all obstacles for coordination improvement. Additionally, if the organization's employees lack motivation, misinterpret the material, do not comprehend the organization's goals or do not understand the nature of some sorts of labor, this can naturally become noncooperation as well. [6]

Consequently, the achievement of work coordination or cooperation of the judicial organization, pursuant to mutual objectives, needs to make use of tools for human trafficking prevention and eradication with efficiency and effectiveness. In addition, the officers involved in a judicial organization must have mutual understanding and be honest. The officers must also jointly set plans and targets together with mutual acceptance and good understanding of the administrators towards the context of their organization.

3. Methods

This research is a qualitative study using in-depth interviews with the entrepreneurs responsible for setting focus group discussions, including data from studying related research work and documents. The target group in this research was the personnel in criminal justice organizations involved in tackling human trafficking, personnel from civil society and Non-Profit Organizations (NGOs), and the authorities from international organizations. The author depends on a purposive sampling of respondents with at least two years of experience in tackling human trafficking (namely, protecting, suppressing, investigating, inquiring, or helping law enforcement officials to combat human trafficking, etc.) and who are experts in human trafficking management. Moreover, other twenty samples were the victims who were divided into groups for in-depth interviews. In this manner, this research could obtain complete information. A group of samples (selected experts from in-depth interviews and experts dealing with human trafficking

issues) in two subsidiary meetings comprised 45 participants.

In-depth interviews and questionnaires utilized during focus group discussion is the research's primary data collection method. Qualitative data analysis was undertaken by using content analysis. Additionally, to analyze the data, triangulation was utilized to examine data by taking into account the data obtained from different methods, which were (1) in-depth interviews, (2) documentary research, and (3) focus group to show the validity of the information and the subsequent results.

4. Results and Discussion

According to data analysis, research results in accordance with research objectives are as follows:

Objective 1 is to study and analyze the system of the justice process and the roles of criminal justice organizations involved in the management of tackling human trafficking. The study discovered that criminal justice organization has many limitations as to the legal dimension and law enforcement dimension. It was also discovered that Thailand's government agencies still lack coordination, necessary power to resolve issues involving multiple departments and agencies, and take too long to implement regulations that, in the end, still cannot address issues in a timely manner.

The organizational structure of judicial bodies is separated, and it is still lacking a central agency to take responsibility in terms of academics and administration. There is also a lack of officers who take responsibility for the policy and a lack of systematic planning of work, financial, and human plans. If there is a central agency or organization for controlling juridical organizations to work jointly in both practice and policy, human trafficking problems will drastically decrease.

In terms of organizational management, it has been found that all five departments (The Royal Thai Police, the Office of the Attorney General, the Court of Justice, the Department of Special Investigation, and the Ministry of Social Development and Human Security) have a closed-system management style with formal organizational characteristics. In contrast, they can cope with human trafficking problems requiring promptness. Depending on the official form (formal administration), the operation will be delayed because of the complicated chain of command. As a result, it is essential to include informal groups to be able to improve the efficiency of the operations.

Objective 2 is to study and analyze the problems and obstacles impacting cooperation between criminal justice organizations involved in tackling human trafficking. According to the research findings, there were many problems regarding the cooperation that can be divided into three phases; pre-legal proceedings, legal proceedings, and post-legal proceedings, as shown in Tables 1, 2, and 3 below.

These problems are deeply rooted, especially regarding the efficiency of the officers in taking legal action against the wrongdoers and the delays in justice proceedings, which leads to the saying:"Justice Delayed is Justice Denied". [7] The issues that cause problems in cooperation between criminal justice organizations involved in tackling human trafficking are as follows.

(1) The government's policy aims to eradicate human trafficking and move away from the Tier 2 Watch List, thus encouraging the government to target eliminating human trafficking crime very quickly by depending on statistics for arresting and sentencing those wrongdoers.However, they seem to have focused more on statistics and quantity than quality. Therefore, the administration of justice is unable to proceed in addition to putting pressure on the officers involved in handling human trafficking cases and fear penalties from supervisors if human trafficking is allowed to occur in responsible areas. Meanwhile, targets are set at the policy level on the number of arrests of offenders in human trafficking cases that lead to unfair actions such as entrapment to come by the appropriate quantity of the case as targeted. The officers handling human trafficking cases cannot respond to the policy, and they eventually end up asking to leave, causing the lack of skilled officers. Consequently, policy decisions regarding human trafficking should come from joint meetings and discussions between the officers handling human trafficking cases and policymakers. There should be a focus on quality rather than quantity so that the officers involved are willing to share information. This makes the prevention and suppression of human trafficking more effective.

(2) Government employee's corruption is a serious issue that hinders collaboration in human trafficking prevention and eradication, making it not as effective as it should be. To make things worse, some officers give assistance to the wrongdoers. Therefore, the government should be more aware of this problem and try to fix the root causes, which are police officers, government agencies, and government policies so as to raise good conscience as responsible government officers in conjunction with giving moral support to the officers as well as providing them with rewards, especially compensation to allow those good officers sustain their lives with pride.

(3) Concerning the processes within organizations, the procedures are complicated and negligent of organization mechanism to support the operation. The policy is difficult to be achieved in case of lacking the leader to work continually. Another vital factor is determining easy and simple working methods and avoiding work overlapping. The team leader should be aware of both budgetary constraints and the potential of their team members. In addition, when a policy produces positive outcomes, the leaders should continue to use it. Even if new leaders are appointed, sound

Table 1. Problems and obstacles impacting cooperation between criminal justice organizations tackling human trafficking during pre-legal proceedings.

Agencies	Problems in cooperation
Police and attorney	(1) Issues in feeding data into a database system. (2) Efficiency issues when briefing and questioning the police officers
Police and Ministry of Social Development and Social Security	Efficiency issues with case file creation and conducting police officer investigations
Police and Department of Special Investigation	Victim protection issues and challenges in victim rescue
Police and the court	Efficiency issues with case filing and police officer investigations
Attorney and the court	Courts often refuse to fill in information in human trafficking directories shared by other judicial agencies.

Table 2. Problems and obstacles impacting cooperation between criminal justice organizations tackling human trafficking during legal proceedings.

Agencies	Problems in cooperation
Police and attorney	(1) Problems of delays in prosecuting the offenders of the inquiry official (2) Problem of arresting the accused to be sent to the prosecution process
Police and Ministry of Social Development and Social Security	Problems of delayed works by the inquiry official
Police and Department of Special Investigation and Ministry of Social	Problems with the funding request procedure for money to be used to combat and prevent
Development and Social Security Attorney and the court	human trafficking Problems of judges in Thailand lack experience in inquisitorial system because Thailand uses a predominantly accusatorial system.

Table 3. Problems and obstacles impacting cooperation between criminal justice organizations tackling human trafficking after legal proceedings.

Agencies	Problems in cooperation
Attorney and the court	Delays through waiting for a copy of the judgment
The agencies related to suppressing human trafficking and the Ministry of Social Development and Social Security	Problems in legal execution after the judgment

policies must still be carried out if success is to be truly achieved.

(4) The efficiency of the officers, who get involved with human trafficking prevention and suppression, needs to cooperate and operate efficiently. Staff in criminal justice organizations must work with collaboration and coordination systematically. It is improper to let each department take its own responsibility separately. Instead, they have to coordinate with other organizations, such as the Ministry of Labor, Ministry of Foreign Affair, and private Non-Governmental Organizations (NGO).

The research's conclusions about operational efficiency show that there are several problems with operational efficiency at police officer level. The most frequent problems are the making of case files and investigation from the police officers, delayed arrest of offenders, and delayed legal proceedings. In addition, the relevant officials often fail to cooperate and communicate with each other, thus making them unaware of different problems.

Due to the aforementioned issues, this is in accordance with the research conducted by Anne Gallagher and Paul Holmes, who found out that the legal system must share responsibility for human trafficking prevention in order to successfully combat human trafficking. Effective information exchange, coordination, and internal and international communication must occur. In accordance with Hodge and Anthony's theories, a lack of mutual trust in partnerships among organizations, limited resources, delayed decision, and internal disagreements are invariably a barrier to collaboration fostering.

Objective 3 is to suggest guidelines for developing and solving cooperation problems and obstacles between criminal justice organizations involved with tackling human trafficking.

Due to the results of this study, the following guide-

lines are suggested to help different organizations in dealing with their cooperation issues:

(1) The integration of departmental collaboration, including policies to resolve the issue of late submissions among departments, cooperative integration strategies, and assistance request from other agencies that are engaged with the pursuit of arrest warrants;

(2) Developing practitioner expertise to enable practitioners to be competent and expert in encouraging the coordination of trade and the discovery of new strategies for human trafficking prevention and combat;

(3) Increasing officers' training and knowledge to help them reach their full potential. The coordination follows the same path with the same set of knowledge;

(4) Cooperation between the government authorities and the victims or sufferers is necessary for successful human trafficking protection and suppression, and this requires adapting and changing the attitude of engaged officers;

(5) Managing personnel and locations for victim classification can be efficient when it consists of knowledgeable personnel and experts in victim classification. Nonetheless, the place for victim classification cannot be operated by only one agency, but it is necessary for many involved organizations to cooperate and understand how to classify the victims;

(6) Enhancing the judicial process of recording testimony by using audio and visual recordings is necessary. This process made it possible to interrogate witnesses in cases involving a large number of victims or witnesses in no time and the testimony is accurate and highly accurate;

(7) Improving and promoting compensation and expenditure that exists during a legal proceeding will help those human trafficking victims get assistance as to necessary expenditures supported by "The funds for protecting and suppressing human trafficking". Regarding "essential expenses," such as transportation costs that are pertinent to the fact and victim or witness' income, the government's support is, nevertheless, insufficient. Therefore, through the Ministry of Social Development and Human Security's cooperation, improvement of support compensation and of the costs incurred during litigation will be implemented;

(8) Providing proper treatment to the sufferers both, during, and after legal proceedings relies on cooperation between any agencies involved to build an effective program by relying on the experience of Non-Profit Governmental Organization (NGO) which succeeds in addressing and recovering the victims taking part in this program. When the case comes to an end, the government agencies have to help figure out how to treat the victims by providing them with compensation in accordance with the judgment;

(9) Regarding the development of the process of searching for evidence in a human trafficking case, it is necessary to rely on the supervision and assistance provided by the Ministry of Social Development and Social Security to provide information, because they are intimate with the human trafficking victims. Additionally, it is necessary to receive cooperation from the attorney and the court so that the police officers can use special devices, such as, eavesdropping device, and request for a financial path review for evidence investigation and acceptance as a spy.

5. Conclusion and Recommendation

According to research results, there are some recommendations as follows:

(1) Policy Recommendations

(1.1) It is necessary to raise awareness of entrepreneurs who are hiring and risk groups, such as women and children, so that they can be aware of human trafficking perpetrators. Moreover, it is vital to warn those human trafficking wrongdoers they will receive the maximum punishment with quick legal proceedings to make them see that the benefits from this illegal act are not worth the severe punishment.

(1.2) It is highly recommended to build cooperation in the public sector. People in their area must help each other to monitor human trafficking offenses and report clues to the authorities. Besides, the government should send police officers to patrol the target areas on a regular basis and maintain a good relationship with people to ensure that they can get full assistance and protection.

(1.3) It is better to appoint officers with expertise in solving human trafficking issues to perform with other frontline officers, such as local police officers, officers from the Minister of Labour, and immigration officers.

(1.4) The government should ask for contributions from any capitalist groups both domestically and internationally so that they can contribute money to help the victims, together with increasing the number of volunteer groups, supporting sanctuaries, and helping to recover those victims, and also buttressing the work of the officers because criminal justice procedures are expensive.

(1.5) The government should organize a system for developing strategies and policies in the same direction. There is a clear and comprehensive overall policy and guiding strategy covering the mission of the justice system.

(1.6) It is important to set up central agencies to take responsibility for the budget allocation for criminal justice procedures, together with following up, monitoring, investigating, and facilitating evaluations on work performance of subsidiary systems in the criminal justice process in accordance with the strategic and budget plans.

(1.7) It is important to establish a central agency as the center for information technology of criminal justice procedures involving human trafficking preven-

tion and suppression to support the operation and missions of any department with efficiency.

(1.8) The government should place more importance on giving compensation to human trafficking victims while amending the law to confiscate from those human trafficking wrongdoers after that this compensation must be returned to the funds for compensating for the damages caused by human trafficking, rather than falling into state property so as to take legal execution according to judgment. Accordingly, those sufferers can ask for monetary compensation from this fund.

(1.9) There should be a periodic and consistent review of work performance after the agencies concerning with human trafficking prevention and suppression conform to the systems and working methods. Additionally, there needs to be a measurement of how well criminal justice organizations are doing their jobs so that the society can see that criminal justice practices are compatible with all systems. Therefore, this indicator can show the efficiency of the police officers with reliable statistics so as to capture excluding scapegoats. Meanwhile, the efficiency of the attorney is to reduce dismissal by the court because of the strong evidence. The effectiveness of a court is a thorough and fair trial.

(2) General Suggestions

(2.1) The officers in criminal justice organizations involved with preventing human trafficking should receive training in human trafficking cases by focusing on administrative management practices in accordance with the legal conceptual framework, together with realizing their roles, taking responsibility, and focusing on mutual cooperation.

(2.2) It is essential to adjust the attitudes of the officers involved with human trafficking protection and suppression to reduce the damage caused to the victims, especially in the case of illegal prostitution. However, government officers mostly use biased attitudes that make operations lacking injustice, such as using improper words, discriminating, and assuming that these women volunteered to become involved in prostitution. Hence, understanding the feelings of the sufferers would help the officers to perform their work more efficiently while the sufferers can have positive attitudes towards the officers, being ready to give their cooperation. If this condition is met, other countries could see that Thailand gives high respect to the pride and dignity of humans.

(2.3) It is crucial to set up projects that are accessible to the victims, the sufferers or the witnesses of human trafficking with special care. Alternative measures need to be set out for proving the evidence by focusing on protecting witness identification, privacy, and dignity i.e., taking evidence by videoing confidentially and concealing the witness. However, taking evidence must be fastened with legal consultants who require nothing in return. As for the minor witness, there must be extra measures to ensure privacy, safety, and life betterment.

(2.4) In human trafficking cases, most of the offenders are highly influential, and it is difficult to find evidence; hence, acquiring the evidence through informal channels needs to depend on intimacy or extra measures in order to get evidence. Indeed, it is vital to listen to unofficial evidence in human trafficking cases, especially, when that evidence is of importance for the cases being able to result in punishment for the wrongdoers.

(2.5) When coordinating with private or public organizations, the officers of criminal justice procedures involved in tackling human trafficking must be really careful because it has high risk for safety of officers, victims, and witnesses. When the government officials need to contact the public sector directly, the coordinators need to explain the issue comprehensively, so that the public sector can be informed about what happens, and can then give good advice.

(2.6) Cooperation in criminal justice processes needs to rely on cooperation between both internal and external organizations. Similarly, administrators should build cooperation within their organization and make it stronger before initiating external cooperation by encouraging the administrators in the criminal justice process to cooperate with each other in order to operate in the same direction.

(2.7) Managing organization working style and operations of organizations would help work performance to move forward in the right direction while being able to promote mutual cooperation with other organizations, thus resulting in a smooth operation. After that, personnel should be developed together with building moral support, subsequently contributing to their work performance and eliminating internal conflicts so that organizations can increase efficiency with the ability to work jointly with other organizations with high efficiency as well.

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7. Conflict of Interest

No conflict of interest

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Personal Protection from Agricultural Chemicals among Older Farmers in Nakhon Pathom Province

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Abstract

Significance: Most of the older persons who work as farmers in Nakhon Pathom Province still use agricultural chemicals to increase productivity and eliminate pests. There is evidence that their physical condition is deteriorating because the process of excreting chemicals from the body is ineffective due to the deterioration of the liver and kidneys. This study aimed to examine personal protection from agricultural chemicals among older farmers in Nakhon Pathom Province. A cross-sectional descriptive study design was employed. Data were collected from 179 older farmers through the questionnaires. Descriptive statistics were used to analyze the data. They showed that most participants had practiced personal protection from agricultural chemicals at a good level. The top three behaviors they practiced were immediately cleansing the body when arriving home after using chemicals (85.5%), wearing long sleeves (83.8%), and separating contaminated laundry (83.2%). The lowest three protection behaviors were wearing a rubber apron at all times (41.9%), visiting a doctor/health worker when there is an illness or discomfort (57.0%), and wearing rubber gloves at all times (58.7 %).

Therefore, the development of chemical labels, innovative gloves, and chemical-resistant rubber fabrics which would be friendly to older people should be recommended. Also, a safe agriculture policy and monitoring of safe agricultural chemicals are recommended.

Keywords: agricultural chemicals, older farmers, older persons, personal protection

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1. Introduction

Farming has been the main occupation of Thailand for a long time; as a percentage of the country's population is engaged in agriculture. According to the data from the National Statistical Office surveying the operational characteristics of the people in 2021, there were 38.07 million occupations in Thailand, 11.15 million of whom were farmers or 29.5%. In 2018, 23.59% of the population of Nakhon Pathom Province were registered as farmers. [1].

Nakhon Pathom Province has 157,301 older persons, 66,624 males, and 90,677 females [2], with 116,874 still working as farmers [3]. Most of the older people in Nakhon Pathom Province who work as farmers still use agricultural chemicals to increase productivity and eliminate pests. Most of the chemicals that farmers use are pesticides, comprising insecticides, herbicides, fungicides, and rodenticides [4]. These chemicals have acute and chronic toxic effects on the health of the body. Acute chemical poisoning will cause symptoms immediately after exposure, such as nausea, vomiting, headache, muscle aches, diarrhea, and shortness of breath. Chronic poisoning will cause cumulative toxicity that can cause diseases or other problems such as cancer, diabetes, paralysis, various skin diseases, infertility, disabilities of the newborn, and sexual dysfunction [5]. Older persons' nature includes a deteriorating body and decreased excretion of waste products from the liver and kidneys. Therefore, the excretion of chemicals from the body is reduced as well. As a result, older persons are at higher risk than adolescents and younger adults of toxic exposure from occupational chemicals that accumulate in the body until acute and chronic toxicity occurs.

Nakhon Pathom Province had the most pesticide use areas, namely Don Tum District, Bang Len District, and Sam Phran District, respectively [6]. Older persons have thinner outer skin and a reduced sense of smell, taste, and touch, making them perceived exposed to agricultural chemicals more slowly. Therefore, more agricultural chemicals are absorbed through the skin [7]. They were causing older persons to be exposed to agricultural chemicals for longer than younger persons. They are more prone to kidney and liver diseases, which are the organs that excrete toxins

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from the body. Therefore, the body can eliminate agricultural chemicals less and increase the danger from chemical residues [8]. Although the chemicals are harmful to the body, the chemical protection behaviors of individual farmers differ according to this literature review of the factors predicting personal protection from agricultural chemicals in working-age farmers. It was found that factors related to chemical protection behaviors were gender, age, knowledge, perceived benefits of wearing protective equipment, and perceived harm of chemicals [9-11].

The preceding information revealed that older persons in Nakhon Pathom Province continue to engage in agriculture at a higher rate than other age groups and often use chemicals in agriculture. Previous research on chemical protection behaviors was done on working-age people [9-11]. Therefore, this research will focus on personal protection from agricultural chemicals among the older farmers who are still farming in Nakhon Pathom Province for planning and implementing activities that help to avert the entrance of chemical pesticides into the body. This study may enable older persons to continue their occupations with enhanced safety. This research aims to study personal protection from agricultural chemicals when using chemicals in farm work among older person farmers in Nakhon Pathom Province.

2. Methods

This research was a descriptive study. The population was farmers aged 60 years and over, with a total number of 116,874 persons in 51,024 households [2-3]. The sample was older people engaged in agriculture and using chemicals in agriculture. The sample size was calculated from a computer program according to the power analysis principle by determining the test power of 0.90, the effect size of 0.15, and the level of statistical significance at the 0.05 level. The sample size to be studied was calculated for 179 people [12]. Inclusion criteria were: 1) being age over 60 years, 2) having currently engaged in agriculture or planting for at least one year, 3) having used chemicals in agricultural work, 4) living in Nakhon Pathom Province, 5) having good consciousness and can communicate in Thai, and 6) having consented to participate in the research by signing or fingerprinting. Exclusion criteria included 1) being diagnosed with COVID-19 or classified as a high-risk group on the day of participation and 2) having an acute illness or inability to provide information.

For the sample selection procedure, a multi-stage sampling method was employed. The first stage was randomly drawn from 3 out of 7 districts by simple random sampling: Mueang district, Kamphaeng Saen district, and Bang Len district. In the second stage, by simple random sampling, Sa Katiam Subdistrict was obtained from Muang District; Thung Khwang Subdistrict was obtained from Kamphaeng Saen District, and Bang Phasi Sub-district was obtained from Bang Len District. The third stage was accomplished by simple randomization by spinning the wheel until the older farmers were obtained according to the specified amount.

The research instruments were the personal characteristics questionnaire and the questionnaire on personal protection from agricultural chemicals when using chemicals in agricultural work. The second questionnaire consisted of 20 items, divided into three parts as follows: 1) before spraying chemicals, four items; 2) during spraying chemicals, nine items; and 3) after spraying chemicals, seven items. It is a three-rating scale questionnaire that asks for personal protection practices when using chemicals in agriculture before, during, and after spraying. The questionnaires allowed the participants to explore themselves and assess their events or actions. The participants were asked to choose only one answer for each question. The scoring criteria were as follows: “practice every time” got three points; “ practice sometimes” was two points; and “never practice” was one point. The scores and interpretation of personal protection from agricultural chemicals practice are as follows.

The personal protection from agricultural chemicals practice mean scores can be divided into three levels [13] as follows:

2.50 – 3.00 refers to the practice at a good appropriate level.

1.50 – 2.49 refers to the practice at a moderately appropriate level.

0.00 – 1.49 refers to the practice at an inappropriate level.

For interpretation of personal protection from agricultural chemicals practice sum scores, the score of 20-35.4 means inappropriate behavior, 35.5-47.4 means moderate appropriate behavior, and 47.5– 60.0 means good appropriate behavior.

Before spraying chemicals, the sum score of4.0-7.0 refers to inappropriate behavior, 7.1-9.4 refers to moderate appropriate behavior, and 9.5 – 12.0 refers to good appropriate behavior.

During spraying chemicals, the sum score of 9.0-15.9 refers to inappropriate behavior, 12.5-16.6 refers to moderate appropriate behavior, and 16.7 – 21.0 refers to good appropriate behavior.

After spraying chemicals, the sum score of 7.0-12.4 refers to inappropriate behavior, 16.0-21.3 refers to moderate appropriate behavior, and 21.4 – 27.0 refers to good appropriate behavior.

The questionnaire on personal protection from agricultural chemicals of the Division of Diseases from Occupational and Environment, Department of Disease Control, Ministry of Public Health was published for general agencies to use [14]. It is a standard questionnaire that is suitable for those of working age. Therefore, the questionnaire was examined content

validity by five experts: two nursing professors specializing in geriatrics, one measurement and evaluation expert, and two occupational health experts. The index of item objective congruence (IOC) equal to one. This result ensured that older persons could understand the questions and were able to answer. The reliability test of the assessment with 30 older framers in Wang Ta Ku Subdistrict, Mueang District, Nakhon Pathom Province, yielded Cronbach's alpha coefficient of 0.89.

A self-administered questionnaire or face-to-face interviews were used to collect data. The questionnaire was distributed to each participant at home and asked them to answer it themselves. For those inconvenient to answer the questionnaire, such as blurry vision or far-sightedness, the researchers read out, and the participants selected answers by themselves. The duration of the interview was approximately 30 minutes. A total of 197 questionnaires were returned, representing a response rate of 100 percent.

This study is part of a research project on factors predicting agricultural chemicals protection behaviors among older agriculture persons in Nakhon Pathom Province, accredited for human research ethics of the Human Research Ethics Committee, Nakhon Pathom Rajabhat University with a certification number of COA No. 009/2022, dated February 7, 2022. The subjects have been protected following the ethical principles of human research in all respects. All participants have been clarified about the objectives, benefits, and potential risks, including the ability to withdraw from the study at any time without compromising on confidentiality or the overall presentation of the research results. They signed a consent form willingly before data were collected.

3. Results

3.1 General characteristics of the participants

The participants were aged 60-69 years (77.7%), with more males (60.9%) than females (39.1%). More than half (59.2%) of them had congenital diseases, namely high blood pressure (31.1 %) and diabetes (22.4 %). Three-quarters of the participants completed primary education (73.2%), had sufficient family income to cover their expenses (73.2%), and 50.3% of participants grew vegetables and herbs for cooking food. 47.7% of the participants had more than ten years of experience using chemicals, and 9.6% experienced chemical poisoning.

3.2 Personal protection from agricultural chemicals practice

The participants had good overall scores (82.1%). In the three phases—before spraying, during spraying, and after spraying, the scores were at a good level (Table 1). However, for during spraying chemicals, two items were with moderate levels—wearing rubber gloves and a rubber apron. Likewise, for after spraying one item was at a moderate level (landfill use) (Table 2).

According to Table 1, the top two non-practice personal protection that occurred before spraying the chemicals were that one-third (32.4%) of the participants did not wear rubber gloves when mixing chemicals. About a quarter of them (28.5 percent) did not read the detail on chemical container label before purchasing. Regarding personal protection practice during using the chemicals, it was found that the participant did not always practice personal protection. The top two highest scores showed that more than half (58.2%) of the participants did not wear a rubber apron, and 41.3% did not wear rubber gloves all the time when using chemicals in agriculture. It was found that personal protection behaviors were only sometimes practiced. After using agricultural chemicals, the top two rankings showed that 43.9% did not landfill-used containers, and 18.1% did not visit a doctor/health care provider every time when there got an illness or discomfort. The top three behaviors that were the most practiced were immediately cleansing the body when arriving home after spraying chemicals (85.5%), wearing long sleeves and long pants (83.8%), and separating contaminated laundry (83.2%), respectively. The lowest three personal protection behaviors were wearing a rubber apron at all times (41.9%), visiting a doctor/health care provider when got an illness or discomfort (57.0%), and wearing rubber gloves at all times (58.7 %), respectively (Table 2).

4. Discussion

The participants were male, youngest-old, and healthy. However, some had a congenital disease but were still able to carry out their farming similar to a previous study, which found that older persons in Thailand were healthy and still able to work (66.7%) [15].

Overall personal protection from agricultural chemicals behaviors

The overall personal protection from agricultural chemicals practice among the participants was at a good level (82.1%). Since the participants had experience in farming for a long time, behaviors on protection from agricultural chemicals were appropriate. It can be explained that older farmers use life experiences to learn positive behaviors by learning from everyday life, which results in behavioral changes with relatively permanent. This change cannot be explained by any particular event [16]. Moreover, they learned by observing others using chemicals to help them increase their productivity as well as avoid getting sick. These personal protection behaviors have become deeply ingrained in older persons. The results of this study could not be reached in other results regarding limited publication found among older

Table 1. Descriptive results of the participants on the personal protection from agricultural chemicals practice (n=179)

Personal protection from agricultural chemicals	Possible score	Min	Max	M	SD	Interpretation	Level of Behaviors N (%)		
							Inappropriate behavior	Moderately appropriate	Good
-Overall behaviors	20-60	20.0	60.0	52.9	6.8	good	3 (1.7)	29 (16.2)	147 (82.1)
-Before spraying chemicals	4-12	4.0	12.0	10.6	1.9	good	13 (7.3)	30 (16.8)	136 (76.0)
-During spraying chemicals	9-27	9.0	27.0	23.2	3.7	good	4 (2.2)	51 (28.5)	124 (69.3)
-After spraying chemicals	7-21	7.0	21.0	19.1	2.3	moderate	2 (1.1)	20 (11.2)	157 (87.7)

Table 2. Interpretation of personal protection from agricultural chemicals practice classified by item of behaviors (n=179)

Personal protection from agricultural chemicals practice	Practice				
	Mean (SD)	Interpretation	Practice every time (3)	Practice sometimes (2)	Never practice (1)
1. Before spraying chemicals, what do you do?					
1.1 Read the details on the chemical label before purchasing	2.6 (0.6)	good	128 (71.6)	38 (21.2)	13(7.3)
1.2 Follow the instructions given on the label	2.7 (0.5)	good	130 (72.6)	44 (24.6)	5 (2.8)
1.3 Wear rubber gloves when mixing chemicals	2.5 (0.8)	good	121 (67.6)	28 (15.6)	30 (16.8)
1.4 Use materials or wood to mix agricultural chemicals	2.7 (0.5)	good	136 (76.0)	37 (20.7)	6 (3.4)
2. During spraying chemicals, what do you do?					
2.1 Wear a facial mask	2.7 (0.5)	good	142 (79.3)	28 (15.7)	9 (5.0)
2.2 Wear rubber gloves at all times	2.4 (.8)	moderate	105 (58.7)	39 (21.7)	35 (19.6)
2.3 Wear long sleeves and long pants	2.8 (0.5)	good	150 (83.8)	24 (13.4)	5 (2.8)
2.4 Wear rubber boots	2.5 (0.8)	good	125 (69.8)	24 (13.4)	30 (16.8)
2.5 Wear a wide-brimmed hat	2.8 (0.5)	good	145 (81.0)	27 (15.1)	7 (3.9)
2.6 Wear a rubber apron at all times	2.0 (0.9)	moderate	75 (41.9)	37 (20.7)	67 (37.4)
2.7 Stand upwind	2.7 (0.5)	good	125 (69.8)	52 (29.1)	2 (1.1)
2.8 Do not eat/drink in the sprayed area	2.7 (0.5)	good	133 (74.3)	42 (23.5)	4 (2.2)
2.9 Do not smoke cigarette/tobacco	2.5 (0.8)	good	125 (69.8)	26 (14.5)	28 (15.6)
3.After spraying chemicals, what do you do?					
3.1 Wash hands immediately before eating/drinking	2.8 (0.4)	good	148 (82.7)	29 (16.2)	2 (1.1)
3.2 Take a shower immediately to cleanse the body when you get home	2.8 (0.4)	good	153 (85.5)	24 (13.4)	2 (1.1)
3.3 Immediate removal of clothing	2.8 (0.4)	good	151 (84.4)	26 (14.5)	2 (1.1)
3.4 Separate contaminated laundry	2.8 (0.5)	good	149 (83.2)	24 (13.4)	6 (3.4)
3.5 Separate containers and equipment for spraying chemicals	2.8 (0.4)	good	147 (81.1)	29 (16.2)	3 (1.7)
3.6 Landfill used agricultural chemical containers	2.3 (0.9)	moderate	116 (58.9)	26 (13.2)	55 (30.7)
3.7 Visit a doctor/health care provider when getting an illness or discomfort	2.8 (0.5)	good	102 (57.0)	25 (14.0)	8 (4.1)

farmers. However, the results were similar to the study of the pesticide use behavior of working-age [17, 18]. But they were different from the study of risk behaviors regarding pesticide use among adult-age farm-

ers, which indicated that only one-fourth to one-third had personal protection behavior of herbicide use at a good level [19, 10]. 95.0% of the labor-age and older farmers had moderate personal protection behaviors [20]. In comparison, the working age group in Ghana used protective measures during pesticide application, around 70% [21].

Before spraying

Participants showed good behaviors of personal protection before spraying chemicals (76.0%). However, some participants had inappropriate personal protection practices, for example, 28.5% did not read the details on the chemical container label before purchasing and 16.8% wore rubber gloves when mixing chemicals. In previous studies, over half of the working-age farmers did not wear protective equipment while mixing pesticides [23, 24] because it made them work slower and more uncomfortable, especially in hot and humid climates [24]. Farm workers in developing countries were limited in reading chemical labels because there were no labels in the local language, agricultural farm workers were illiterate [25], and the words of neighboring farmers [26]. This differs from the study of Thai working-age farmers, which found that 62.0% read chemical labels and well understood the information [19].

During spraying

During chemical spraying, wearing aprons and rubber gloves was a less common practice among participants, which allowed agricultural chemicals to penetrate the body. Furthermore, working-age farmers did not cover their mouths and noses with cloth or wear masks or glasses. They also did not wear socks, gloves, or boots while spraying pesticides [23]. The agricultural farm workers may refuse to use protective clothing for cultural reasons because they feel uncomfortable or lack a way to clean them for reuse [25].

After spraying

Although the participants were highly experienced in using chemicals in agriculture, 47.7% had more than ten years of experience using chemicals, 9.6% of the participants still experienced chemical poisoning. In addition, visiting a doctor/health worker for an illness or discomfort was at a low-level protective behavior among the participants. This information supported those older farmers who were not fully aware of the dangers of chemicals in agriculture, not realizing that these inappropriate behaviors would result in long-term effects. Likewise, the working-age farmers were reported on performing inappropriate safety behavior after using chemicals, e.g., disposing of pesticide containers in the trash, burying their used agricultural chemical containers, using empty pesticide containers to store food [19], and landfilling empty pesticide containers on farms and hazardous waste collection sites [27]

5. Conclusion

Even the personal protection behavior when using chemicals in the agricultural work of elderly farmers is at a good level both before, during, and after spraying chemicals. But more than half of the older farmers wear rubber aprons and rubber gloves. The landfill of all used agricultural chemicals containers could have been at a better level. As a result, older farmers risk to side effects from accumulated chemicals in agricultural work in their bodies beyond the safety limit.

6. Recommendation

Those involved should encourage older farmers to engage in behaviors of wearing a rubber apron, wearing rubber gloves, and landfilled used agricultural chemical containers. They should also promote reading chemical labels before purchase and before use by developing easy-to-read chemical labels with big letter fonts for older persons.

Further research should examine the factors predicting personal protection behaviors for older farmers and their families regarding exposure to agricultural chemicals. Research focuses on a tailored intervention regarding proper use, such as modification of the behavior of farmers and raising awareness of agricultural chemicals' harmful and toxicity, developing and innovating personal protective equipment, e.g., gloves, aprons, and legible product labels that are friendly to older persons should be done. The study results indicated that although the older farmers had high occupational experience, the behavior of using self-protection equipment and disposal of chemical containers was inappropriate. Policymakers can apply the results of this study by encouraging social aging innovation in personal protection equipment, establishing a safety agriculture policy, and monitoring safe agricultural chemicals use.

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Developing A Participation-Building Model for Promoting Active Ageing among Older Adults

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Abstract

This study aimed to develop and study the effects of a participation-building model for promoting active ageing among older adults. The methodology in this study was a mixed method, including 1) deriving lessons from three best practice areas with high indices of older adult participation, 2) use of data from Stage 1 as baseline information presented in focus group discussions for developing the model, and 3) study of the effects of the Participation-Building Model for Promoting Active Ageing among Older Adults through quasi-experimental research. The results show a model consisting of area executives with the following policies and plans for supporting older adults who have the leisure to participate in social activities: 1) modifying facilities, environments, and communications; 2) supplying necessary equipment; and 3) providing lecturers to offer knowledge about activities, self-care, and communication technology. The people responsible for providing information and coordinating activities were arranged. At six months after the quasi-experiment, the mean scores of the experimental group were higher than the control group (t = 7.166, p =.000 and t = 7.570, p =.000, respectively). In addition, the experimental group's mean scores for posttest participation and active ageing were found to be higher than the pretest scores (t = -4.030, p =.000 and t = -3.422, p =.002, respectively).

According to the findings, the older adults who participated in social activities were found to have higher levels of engagement in active ageing with greater ability for self-care and security while participating in activities continually with a generally friendly attitude toward their surroundings. Therefore, it can be concluded that the program provides guidelines for promoting participation among older adults so they can be ready to perform activities in daily life, have good health, and be independent.

Keywords: active ageing, participation-building, Active Ageing Index, older adult

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1. Introduction

Thailand fully became an ageing society in 2021 and is expected to become a super-aged society in 2035 [1]. Consequently, Thailand's demographic structure will have a higher ratio of older adults with a smaller working-age population. Furthermore, Thailand reported over one million births in 1963–1983 and these people will become elderly in 2023, which means over one million people will become older adults each year from 2023 onward [2]. This will accelerate Thailand's transition to an ageing society. When a person grows older, the body undergoes age-related deterioration. According to the Biological Theory of Ageing, older adults have reduced organ function and subsequently become dependent [3].

Based on the assessment and screening of older adult health in 2015 by the Ministry of Public Health, the percentage of dependent older adults was as high as 21 percent [4]. In addition, according to a report on the conditions of Thai older adults in 2016, one-third of older adults have incomes below the poverty line, while the number of older adults living alone or living with other older adults is rising [2]. According to the situation of Thai older adults in 2018, more than 60 percent of older adults have chronic illnesses leading to increased health deterioration [5]. According to the Disengagement Theory [6], older adults disengage from work if they perceive negative physical changes, or if society views old age as a period of reduced working abilities. This phenomenon reduces the number of workers. In addition, older adults have to leave work upon retirement, which creates a shortage of working-age people, as has happened in countries that first became ageing societies. Changes must be made by raising the retirement age to allow older adults to continue working and hiring more older adult workers. When older adults have work and income, they are enabled to become independent and are not a burden to society [7]. This is consistent with the Activity Theory, which posits that older adults with regular activity are engaged in active ageing and regular social activities with life satisfaction [6].

Thailand has implemented the concept of active

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ageing. According to a survey conducted by the National Statistical Office using the Active Ageing Index (AAI), active ageing has four components consisting of health, participation, security, and a supportive environment. The Active Ageing Index for Thai older adults was 0.685. Health had the highest AAI score at 0.797, followed by security (0.751), supportive environments (0.691), and participation (0.502) [8]. The Active Ageing Index in the area of participation was noticeably lower than in other areas. If participation is promoted, the index for every area should increase. When older adults participate in social activities, they have better physical and mental health, more income, and wider social networks. As a result, older adults feel secure and in harmony with the environment [9]. Therefore, supporting older adults to continually participate in social activities can help older adults have better energy in performing activities and better quality of life. The researcher is interested in developing the Participation-Building Model for Promoting Active Ageing among Older Adults. Therefore, the researcher is interested in participation-building in selected provinces of Thailand in order to achieve high Active Ageing Index scores for older adults in the area of participation and good practices rated at 80 percent and up. The study was conducted in the provinces of Chiang Rai, Nan, and Roi Et, and the program served as the guidelines for promoting participation among older adults in these provinces.

2. Research Objectives

This research was conducted to meet the following four objectives:

1. To transcribe the lessons on good practices in active participation by the elderly.
2. To create a participation-building model for promoting active ageing among older adults.
3. To study the effectiveness of the participation-building model for promoting active ageing among older adults.
4. To present guidelines for policy recommendations for participation-building to promote active ageing among older adults.

3. Research Hypothesis

The participation-building model for promoting active ageing among older adults increases participation and active ageing in this group.

4. Research Conceptual Framework

A conceptual framework for this research is illustrated in Figure 1.

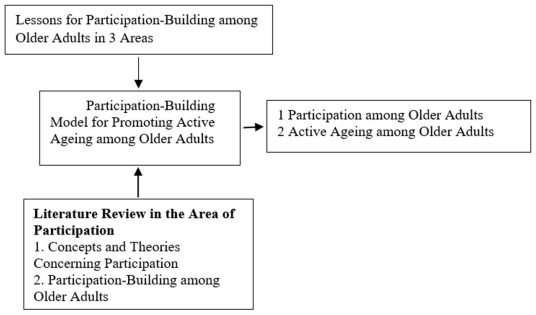

Figure 1: Research Conceptual Framework

5. Literature Review

Participation is one of the main components of active ageing, which can change with age. In particular, when a person becomes an older adult, the body changes in a negative direction, causing older adults to have reduced ability to perform activities of daily living, less ability to perform other activities, and reduced participation in social activities. Based on the Disengagement Theory of Cumming Henry, a person who enters old age is believed to accept reductions in roles and duties, causing the person to gradually retreat from society, thereby reducing interactions with society and income, followed by subsequent dependence [3, 10].

Participation in social activities causes the body to move more, which boosts the body's physical capacity, strengthens muscles and bones, improves health and provides readiness to perform activities that lead to income, friends, networks, knowledge, and abilities, resulting in better quality of life followed by good mental health [3]. Therefore, supporting older adults to participate in social activities promotes activity among older adults while enabling them to perform more activities in daily life and society. Capacity-building to enable older adults who have retreated from activity due to physical deterioration so they can return to activity requires changing to new concepts by preparing environments and older adults to have suitable abilities for activities in the area's context and to meet older adults' satisfaction [11]. Beginning at the policy level, the focus must be placed on success in motivating older adults to participate in social activities [10], as well as arranging environments that facilitate travel, such as close, convenient, and safe environments [12]. Emphasis should be placed on social acceptance of changes in old age. Policies and environments should be supportive of older adults' needs, while changes and advertisements should be made to motivate older adults to participate in activities [13]. Activities should be suitable for older adults' capabilities and personal needs to be developed and enable older adults to perform activities before they start by providing relevant knowledge so older adults can be ready to participate, which will create energy for older

adults to successfully perform activities, help people creatively change worldviews of themselves and society and help people feel valued [14]. Various forms of participation in society can be increased with readiness of resources, individuals, and environment.

Based on the abovementioned information, active ageing in the area of participation can be seen as the main health-related factor because participation causes older adults to have continual movement in activities along with generating income, which creates security for older adults and supports them in becoming active older adults in order to effectively promote participation [13, 15]. Therefore, the researcher is interested in learning the lessons of best practices concerning participation for older adults in the context of people involved in areas with active older adults who participate in activities continually as executives, people responsible for older adults, or workers in fields involving older adults, in order to develop the Participation-Building Model for Promoting Active Ageing among Older Adults.

6. Research Methodology

The research to develop the participation-building model for promoting active ageing among older adults is the product of research and development divided into the following four stages:

Stage 1: Learning lessons on best practices for the participation of older adults in the area.

Stage 2: Developing the participation-building model to promote active ageing among older adults.

Stage 3: Studying the effectiveness of the participation-building model for promoting active ageing among older adults through quasi-experimental research.

Stage 4: Present the findings in terms of policies for building participation among older adults for promoting active aging in this group.

6.1 Population and Sample

In Stage 1, the researcher selected the sample purposively by sampling three of five provinces in Thailand with high Active Ageing Index scores for older adults in the area of participation and good practices rated at 80 percent and up. These provinces were Chiang Rai, Nan, and Roi Et [8]. Subsequently, the researcher selected the most popular activities among the older adults in each province and those in which the number of elderly participation continuously increased, namely those of the Sanklang Tambon Administrative Organization, Bosuak Tambon Administrative Organization, and Buengngam Tambon Administrative Organization, respectively.

In Stage 2, the researcher used data from Stage 1 as baseline information presented in focus group discussions among experts, executives, operators, older adults, and other people involved.

In Stage 3, the researcher purposively selected the sample for the quasi-experimental research from one of five provinces in Thailand with a low Active Ageing Index score, namely Samnak Bok Tambon Administrative Organization, Muang Chonburi, Chonburi, which had 574 older adults consisting of 242 men and 332 women. The sample was matched and assigned to experimental and control groups with 30 subjects each. The sample was aged 60 years and up and had free time to participate in the activities.

6.2 Research Instruments

1) The Participation-Building Model for Promoting Active Ageing among Older Adults that was created based on the focus group discussions in Stage 2 was tested for construct validity by three experts and found to have an index of item objective congruence (IOC) of .89.

2) The three-part interview form on older adults' demographic data, the interview form for measuring participation among older adults, and the interview form for measuring active ageing among older adults, all of which were based on the literature reviewed, were tested for content validity and found to have IOC scores of 0.87 and 0.97, respectively. The forms were revised, tried out, and found to have Cronbach's Alpha Coefficient at .982 and .838, respectively.

6.3 Certification of Research Ethics

The researcher asked for certification of research methods from the Institutional Review Board, Huachiew Chalermprakiat University, and received Certificate COE No. Or. 1017/2563 on 12 October 2020.

6.4 Data Collection

The researcher learned lessons from the three model areas by studying documents and holding focus group discussions about participation-building among older adults. The data obtained were used in focus group discussions with the area where the model was tried out with a low AAI, namely Samnak Bok, Mueang, and Chonburi. The focus group discussions were held with executives, experts, workers, and older adults. In addition, the Participation-Building Model for Promoting Active Ageing among Older Adults was tried with older adults in the area of responsibility. The model was used to measure levels of participation and active ageing among older adults before and after the experiment.

6.5 Research Findings

1) From lessons learned in building participation, the findings from all three areas can be summarized as follows:

1.1) The organization executives in the area had policies concerning participation-building among

older adults with plans and budget allocations to support older adult participation in activities; facilitate participation in activities by older adults; supply the necessary equipment for activities consistent with objectives and provide lecturers to educate older adults about activities, daily life, and healthcare.

1.2) The aforementioned information was publicized to older adults through the people responsible and older adult leaders in order to allow older adults to acknowledge and decide to participate in activities with experience and satisfaction. In addition, the older adults had to be able to self-manage participation in order to be eligible for the activities.

1.3) Personnel in the organizations were assigned to perform duties to coordinate and provide information for older adults who had time in order to consider the ability to manage personal readiness to participate based on individual and area contexts and enable activities to be consistent while helping every older adult gain satisfaction as follows:

(1) Older adults and officials responsible for older adults jointly provided necessary materials and equipment.

(2) The ability to carry out activities was provided by providing more lecturers.

(3) Market networks to distribute products were coordinated.

(4) Networks were built to exchange knowledge and increase product quality.

(5) The activities made it easy to participate, were convenient, not academically focused, aimed at building energy and inspiration, creating smiles, and having resources that were easy to procure in the areas.

1.4) The older adults who had free time received information, so they participated based on their knowledge, ability, and experience. When their knowledge and ability were subsequently improved, their participation in activities was adjusted as suitable for individual capacity. As a result, the older adults were satisfied and happy, so they continued to participate and perceived their readiness to continue participating.

2) The conclusions drawn from the lessons learned were developed into the participation-building model for promoting active ageing among older adults as follows:

2.1) The organization executives in the area had policies concerning participation-building among older adults with plans and budget allocations to support older adult participation in activities; facilitate participation in activities by older adults; supply necessary equipment for activities consistent with objectives; and provide lecturers to educate older adults about activities, daily life, and healthcare.

2.2) Personnel in the organizations were assigned to perform duties to coordinate publicizing the aforementioned information to older adults to acknowledge and decide to participate in activities with experience and satisfaction. In addition, older adults had to be able to self-manage participation to be eligible for the activities, and to provide information for older adults who had time in order to consider the ability to manage personal readiness to participate in individual and area contexts, while enabling the activities to be consistent and help every older adult to have satisfaction as follows:

(1) Older adults and officials responsible for older adults jointly provided necessary materials and equipment.

(2) The ability to carry out activities was developed by providing more lecturers.

(3) Market networks were coordinated to distribute products.

(4) Networks were built to exchange knowledge and increase product quality.

(5) The activities made it easy to participate, were convenient, not academically focused, aimed at building energy and inspiration, creating smiles, and having resources that were easy to procure in the area.

2.3) The older adults who decided to participate in the activities gained knowledge, developed skills, and underwent role changes through participation in the activities appropriate for them, namely engaging in management, decision-making, performing activities, procuring resources, coordinating work, publicizing information, and receiving benefits together. For example, the older adults perceived improved health, had greater ability to participate in activities, gained security in life and perceived their environments as being conducive to life, all of which made them ready for active ageing.

The sample in the experiment was divided into experimental and control groups. Most of the experimental group was female (73.33%). In the area of age, subjects ranging from 70 to 74 years were found to have the highest percentage (36.67%), followed by subjects aged 65-69 years (26.67%). Four out of ten of the experimental group were married (40%). Most of the experimental group had primary education (80.00%). About one-third of the experimental group did household chores (30.0%) and had four or more family members (36.67%). Most of the experimental group (53.3%) had incomes less than 800 baht per month, had chronic illnesses (73.33%), and were members of associations or clubs (60%). In the control group, most of the subjects were female (66.67%). In the area of age, subjects ranging from 60 to 64 years were found to have the highest percentage (33.33%), followed by subjects aged 65-69 years (30.00%). Almost half of the experimental group was married (46.67%). Most of the experimental group had primary education (63.33%). One-third of the experimental group did household chores (33.33%) and four out of ten had four or more family members (40.00%). Most of the experimental group (63.33%) had incomes less than 800 baht per month, had chronic illnesses (63.33%), and were members of associations

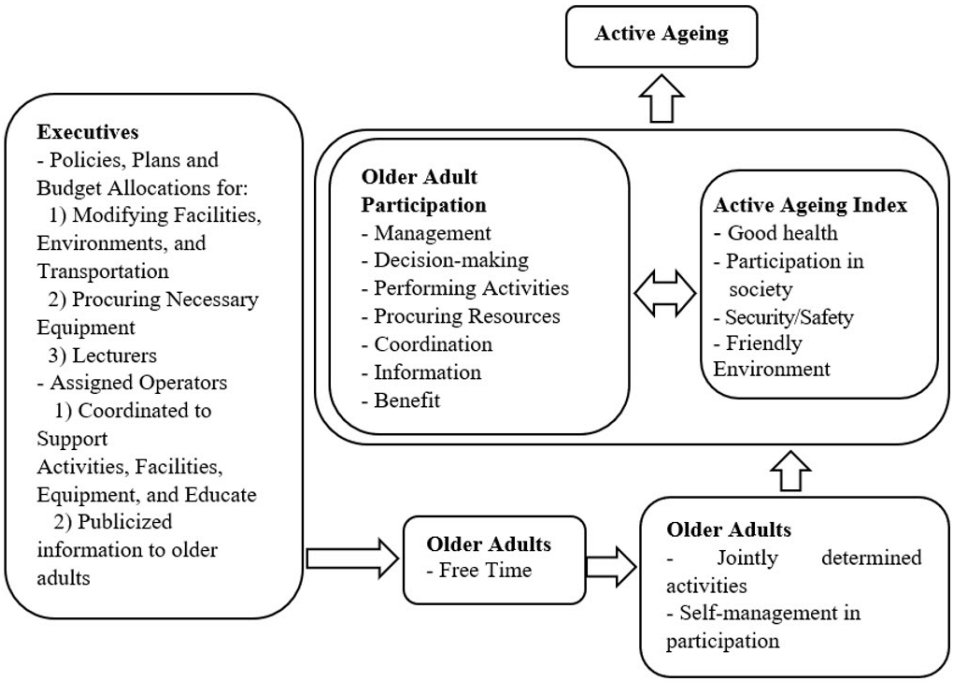

Figure 2: The Participation-Building Model for Promoting Active Ageing among Older Adults.

or clubs (66.67%). Mean scores for demographic data were compared to find differences between groups and every variable of the sample in the experimental and control groups was found no differences.

According to the table, the pretest participation of the older adults in the experimental and control groups was found at a moderate level (x = 2.246, SD =.822 and x = 2.395, SD =.708, respectively) and active ageing was found similar at a moderate level (x = 3.448, SD =.654 and x = 3.563, SD =.537, respectively). Both groups had mean scores for participation and active ageing with no difference (t = -1.149, p =.255 and t = -.741, p =.461, respectively). Six months after the experiment, the older adults in the experimental group had moderate participation (x = 2.980, SD =.703), while those in the control group had low participation (x = 1768, SD =.603). The experimental group had active ageing at a high level (x = 3.871, SD =.360) while the control group had active ageing at a moderate level (x = 3.175, SD =.351). When differences in the mean scores for participation and active ageing were compared in both groups, the mean scores for participation and active ageing in the experimental group were found higher than of the control group (t = 7.166, p =.000, and t = 7.570, p =.000, respectively).

According to the table, the experimental group was found having higher mean pretest and posttest scores for overall participation and active ageing with statistical significance (t = -4.030, p =.000 and t = -3.422, p =.002, respectively), while the control group had lower mean pretest and posttest scores for overall participation and active ageing with statistical significance (t = 4.279, p =.000 and t = 3.589, p =.001, respectively).

7. Discussion of the Findings

Based on the findings of this study, the following two issues were revealed:

1. The participation-building model for promoting active ageing among older adults.

2. Effectiveness of the participation-building model for promoting active ageing among older adults.

1. The participation-building model for promoting active ageing among older adults consists of local executives with policies for building participation among older adults, including plans, supporting budget allocations, and advertisements of information concerning the organization of activities for older adults in the area, because policies are a guideline toward practices that build confidence. In addition, the older adults had access to knowledge about activities that matched their interests, including facilities, equipment, resources, knowledge, development of abilities, and public transportation facilitating participation in activities. In order to help older adults decide to participate in activities, policies had to include participation-building, such as the promotion of older adult readiness and policies for developing environments related to participation. These policies give older adults confidence in their personal capacity in the visible environment, perceived safety in participating, and confidence in benefits as motivation to participate in the activities. It is because the participation of the older adults in each respective area depended on the characteristics, traditions and culture, resources and ability to procure re-

Table 1. Comparison of Mean of Pretest and Posttest Scores for Participation and Active Ageing among Older Adults between the Experimental and Control Groups.

	Variables	Experimental Group		Control Group		t	P
			SD		SD		(2-tailed)
Pretest	Participation of Older Adults	2.246	.822	2.395	.708	-1.149	.255
	Active Ageing	3.448	.654	3.563	.537	-.741	.461
Posttest	Participation of Older Adults	2.980	.703	1.768	.603	7.166	.000
	Active Ageing	3.871	.360	3.175	.351	7.570	.000

Table 2. Comparison between Pretest and Posttest Mean Scores for Participation and Active Ageing among Older Adults in the Experimental and Control Group.

Group	Variables	Pretest		Posttest		t	P
			SD		SD		(2-tailed)
Control Group	Participation of Older Adults	2.393	.708	1.768	.603	4.279	.000
	Active Ageing	3.563	.537	3.175	.351	3.589	.001
Experimental Group	Participation of Older Adults	2.246	.822	2.989	.697	-4.030	.000
	Active Ageing	3.452	.649	3.880	.360	-3.422	.002

sources and friendliness of the environments of each social context or setting in the respective areas [16, 17]. As a result, the older adults were able to easily manage themselves while participating in the activities [18]. When the older adults had sufficient and necessary equipment for activities, they were satisfied with the activities and gained energy from them [19]. When the older adults participated in the activities and benefited from having good health and better quality of life, including participation in society, the older adults had income security, which was a major factor in achieving the goals of building sustainable participation, causing older adults to be engaged in active ageing and good health [20]. This was consistent with a study conducted by Levasseur et al. [21] who found that building older adult participation in communities, particularly at the area level or having public transportation systems that are supportive for older adults while providing sufficient information, changes to activities for easy access and participation in order to help older adults make the decision to participate. Most of the older adults who participated in the activities perceived benefits to themselves and/or society, and came frequently because they perceived a higher ability to perform activities, causing them to feel more valued and gain more income. Afterwards, the older adults perceived the environment to be more supportive of health because they had better self-management ability or better ability to adapt to that environment [9], which led to readiness of energy, ability, intellect, and knowledge to perform preferred activities within cultural and environmental contexts likely to be beneficial and enable the activities to be easily successful [22].

2. Regarding the efficacy of enhancing the participation-building model for promoting active ageing in the experiment, the mean scores for the participation of older adults and active ageing of the experimental group were found higher than the control group at six months after the experiment. This showed that the participation-building model for promoting active ageing caused older adults to have higher overall participation in activities, causing correspondingly higher active ageing scores. The finding was consistent with the findings of Punyakaew et al [23], who found that social participation leads to active ageing in older adults in the areas of health, social participation, and security guarantees in life. It is because the older adults, who decided to participate in activities and perceived participation to be valuable to communities, had better health, were able to return to performing previously inconvenient activities, had more income, built wider networks, had higher self-esteem, and perceived energy and readiness to perform activities continually [9]. In addition, participation in activities created learning opportunities from performing

activities, maintaining health, and using technology.

The control group did not receive participation-building in the activities. Therefore, participation in activities did not rise in the control group and declined with statistical significance in terms of levels of participation and active ageing. It is because they did not participate in the activities. Furthermore, as time passed, their bodies underwent age-related and degenerating changes. In addition, social networks gradually narrowed with these physical changes. Consequently, their readiness to participate in activities decreased which directed them to avoid leaving home. The number of older adults in the control group who participated in old activities declined accordingly. In addition, these older adults in the control group received less information from society due to having fewer social interactions, thereby reducing social participation [23]. As a result, they had reduced readiness for activities or active ageing, which might led to dependence. This was a factor causing accelerated physical degeneration, lower income, loss of life security, and difficulty living in their degenerated conditions. This finding corresponds with the findings of a study by Gottlieb Gillespie [24] who compared non-volunteers to volunteers and found people with experience as volunteers to have less depression, less frequent use of health services and lives longer than people who were non-volunteers. It is because targeting social participation may present one of the greatest opportunities to improve older adults' general health [9].

8. Recommendations

Based on the findings, the researcher proposes the following three recommendations:

9.1 Policy Recommendations

1) Local agencies are responsible for the quality of life among older adults; therefore, they should have the following policies concerning participation in activities for older adults:

(1) Local older adults, particularly those with leisure time, should receive the following support to perform activities with budgetary support from local agencies in order to provide information for older adults to participate in activities organized by local agencies:

(2) Activity venues should be modified to facilitate the lives of older adults and ensure their safety, such as in restrooms, floors, recreation areas.

(3) Transportation systems should be modified and provided to enable older adults to manage their personal travel, e.g., by reducing travel time and distance, maintaining road surfaces or pathways in good conditions, providing transportation with seats, ensuring convenience in walking or cycling, and providing safe public transportation systems.

2) Personal travel should be encouraged by reducing travel time and distance, maintaining road surfaces or pathways in good conditions, providing seating, facilitating walking or cycling, and providing safe public transportation systems.

3) Activity equipment and resources should be provided.

4) Lecturers to improve knowledge and ability to perform activities in accordance with older adults' current contexts and needs within appropriate contexts should be provided.

5) Lecturers to improve knowledge, communication skills, technology, and other necessary skills for older people should be provided.

6) Responsible people should be assigned for implementing plans and facilitating activities to be consistent with agency policies in the following duties:

(1) Providing required knowledge and coordinating with older adults and networks to manage professions lecturers, older adult lecturers, volunteer lecturers, exports, and supporting organizations.

(2) Planning and coordinating the building, facility, and environmental construction and remodeling, including communication and public transportation systems.

(3) Collaborating with older adults to obtain and provide adequate activity equipment.

(4) Coordinating the distribution of products from activities for older adults to earn income, which can lead to the security and safety of older adults.

(5) Disseminating information about the anticipated benefits for older adults, society, and communities to encourage participation.

(6) Participating in managing activities to be consistent with older adults' needs and regional contexts.

(7) Promoting activity management by older adults with support from agencies through the responsible persons in order to help older adults feel as if they are part of activities, and building engagement and participation in activities in every step and model, including activity consistency.

(8) Encouraging network expansion so that older adults can exchange knowledge, abilities, and experiences, as well as expanding markets, to ensure that they gain experience and expected benefits.

8.1 Operational Recommendations

The findings can be used as guidelines for building participation among older adults to get them ready to perform activities in daily life, have good health, be independent, and build security for older adults. When they participate in activities continually in order to build security, safety in life, and harmony with the environment, it will lead to higher Active Ageing Index scores.

1) Researchers, operators, or those involved should investigate the factors influencing social participation among older adults in different environmental conditions and times change in order to provide baseline data for developing the Participation-Building Model

for Active Ageing among Older Adults in line with future contexts and possibilities.

2) Studies should be conducted to compare the effectiveness of older adult participation in promoting active ageing in small and large groups to provide more effective guidelines for building participation among older adults.

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