Data Science in Policing in Thailand: Challenges and Future Directions – A Review From International Perspectives

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Abstract

Data science has become an essential element in contemporary policing, offering tools to enhance crime prevention, improve resource allocation, and strengthen decision-making. In Thailand, however, the integration of data science into policing is still in its early stages, characterised by fragmented initiatives and limited strategic direction. This article examines the current state of data science in Thai policing through a critical review of international practices and conceptual frameworks. Drawing from examples in the United States, United Kingdom, Singapore, South Korea, and Japan, it highlights how different governance models have shaped the adoption of predictive analytics, algorithmic tools, and evidence-based policing. While Thailand has made initial progress in developing digital crime databases and surveillance systems, efforts remain inconsistent and lack overarching coordination and ethical oversight. The article identifies both opportunities – such as enhanced inter-agency collaboration and data-driven resource deployment – and challenges, including infrastructural fragmentation, ethical risks, and institutional resistance. It concludes with a set of policy recommendations for the Thai government, including the creation of a national framework, investment in research-led training, ethical regulation of surveillance technologies, and stronger partnerships with academia and civil society. The article argues for a locally grounded, balanced approach to data-informed policing that prioritises effectiveness, legitimacy, and public trust.

Keywords: Data Science; Policing; Predictive Analytics; Evidence-based Policing

1. Introduction

The advent of data science has fundamentally transformed numerous sectors worldwide, and policing is no exception. In the era of digital transformation, law enforcement agencies are increasingly turning to data-driven methods to enhance operational efficiency, improve decision-making, and strengthen crime prevention efforts. Data science, which encompasses techniques such as machine learning, predictive analytics, and data mining, offers new opportunities to understand crime patterns, allocate resources more effectively, and increase transparency and accountability within policing systems (Provost, & Fawcett, 2013; Perry et al., 2013). Globally, jurisdictions such as the United States, the United Kingdom, Singapore, and South Korea have made significant strides in integrating data science into their policing practices. These countries have implemented various models of predictive policing, crime mapping, and algorithmic decision-making to support frontline officers and policymakers (Meijer, & Wessels, 2019; Brayne, 2017). For instance, predictive policing systems in the United States have been used to forecast crime hotspots, while the United Kingdom has focused on developing ethical frameworks to regulate the use of artificial intelligence in law enforcement. Singapore has applied advanced analytics in its "Smart Nation" policing strategy, and South Korea has leveraged its technological infrastructure to support real-time crime monitoring.

Despite these advances, the adoption of data science in policing is not without controversy. Scholars and practitioners have raised concerns about algorithmic bias, data privacy, over-policing in marginalised communities, and the erosion of public trust (Lum, & Isaac, 2016; Ferguson, 2017). These critiques highlight the need for a balanced approach that maximises the benefits of data science while safeguarding ethical principles and human rights. In Thailand, the integration of data science into policing is still in its formative stages. While the Royal Thai Police (RTP) has initiated several technology-driven projects - such as digital crime databases,

CCTV analytics, and pilot predictive policing tools - there remains a lack of systematic implementation, cross-agency collaboration, and clear data governance structures (Santad et al., 2023). Public opinion polls also indicate alarmingly low levels of trust in law enforcement. A 2023 national survey revealed that over 70% of Thai respondents expressed little or no confidence in police performance (The Nation, 2023), a figure that contrasts sharply with countries such as South Korea and the United Kingdom, where police trust levels often exceed 60% (Organisation for Economic Co-operation and Development, 2025). Concurrently, Thailand's intentional homicide rate has risen from 1.84 per 100,000 in 2021 to 2.20 in 2023 (United Nations Office on Drugs and Crime, 2024), indicating a growing need for more strategic and intelligence-led approaches to public safety. Moreover, the use of data in Thai policing has been largely operational rather than strategic, with limited academic scrutiny or public debate on its implications. This article aims to fill this gap by conducting a comparative review of international experiences in the application of data science in policing and critically analysing their relevance to the Thai context. By drawing on scholarly literature and real-world examples, it seeks to identify best practices, key challenges, and policy considerations that can inform the development of a more robust and ethical data science ecosystem within Thai law enforcement. Ultimately, the article proposes a set of strategic recommendations to guide Thailand toward responsible and effective data-driven policing in the future.

2. Objectives
1) To examine the current landscape and strategic development of data science in Thai policing.
2) To critically analyse the opportunities and challenges in integrating data science into Thailand's law enforcement.
3) To propose recommendations to the Thai government for the development of data science policy in policing.

3. Theoretical Frameworks and Concepts in Data Science and Policing

The integration of data science into modern policing is not simply a matter of applying new tools or adopting technical efficiencies - it represents a fundamental epistemological shift in how knowledge is constructed, decisions are made, and power is exercised within criminal justice institutions. As policing becomes increasingly datafied, it is essential to understand the conceptual underpinnings that guide, justify, and critique these transformations. This section explores four interrelated frameworks that shape the discourse on data science in policing - predictive policing, evidence-based policing, algorithmic governance, and data justice - with the aim of contextualising Thailand's current landscape, analysing key challenges, and informing future policy directions.

3.1 Mapping the Landscape: Predictive Policing and Risk Anticipation

Predictive policing has emerged as the flagship application of data science in law enforcement. It refers to the use of statistical algorithms and machine learning models to forecast future crimes, offenders, or victims, based on historical crime data, geospatial patterns, and various socio-economic indicators (Perry et al., 2013). The appeal of predictive policing lies in its promise of proactivity – moving policing from reaction to anticipation, from uncertainty to statistical probability. Yet the conceptual logic behind predictive policing is more complex than a technical fix. It is rooted in actuarial thinking, where risks are quantified and resources allocated accordingly (Harcourt, 2019). This shift reflects broader transformations in governance: from rehabilitating individuals to managing populations through risk scoring and surveillance. While predictive systems such as PredPol have been lauded for improving patrol efficiency and reducing property crimes in certain contexts (Mohler et al., 2015), a growing body of research highlights the perils of feedback loops, racialised targeting, and opaque methodologies (Lum, & Isaac, 2016; Brayne, 2021).

In practice, predictive policing may reinforce the very inequalities it seeks to prevent. Historical crime data are often products of biased policing practices – over-policing of minority communities, underreporting in informal settlements, or discretionary decisions shaped by societal prejudice. When these data are used to train predictive algorithms, they risk encoding and perpetuating systemic bias under a veneer of scientific neutrality (Longworth, 2021). This is particularly problematic in jurisdictions with limited data integrity, weak oversight mechanisms, and contested police legitimacy – as is often the case in the Global South. Here, predictive systems may be implemented without adequate safeguards, leading to arbitrary enforcement and diminished public trust.

Predictive policing should also be understood as part of broader crime prevention strategies. In many jurisdictions, including Thailand, data science supports preventive policing efforts across diverse domains, ranging from transnational crimes like human trafficking and cybercrime to domestic violence and property offences. Digital forensics plays a pivotal role here, enabling the extraction, preservation, and analysis of digital evidence to support real-time decision-making (Casey, 2011). These data-driven preventive approaches rely on integrated crime databases, social media analytics, and communication metadata, allowing law enforcement agencies to anticipate threats and allocate resources more strategically (Thompson, 2022). However, in contexts where forensic infrastructure is limited or unevenly distributed – as in many parts of Thailand – such systems risk reinforcing existing inequities and missing crimes occurring in informal or digitally invisible spaces.

3.2 Institutional Capacity and Challenges: Evidence-Based Policing in Context

In contrast to the predictive paradigm's focus on forecasting risk, evidence-based policing (EBP) emphasises the systematic use of research evidence to inform policing strategies and policy decisions. Rooted in the principles of experimental criminology and policy evaluation, EBP advocates for the development and implementation of interventions that are empirically tested, rigorously analysed, and contextually appropriate (Sherman, 2013). EBP positions policing as a professional domain grounded in knowledge rather than tradition or intuition. In jurisdictions such as the United Kingdom, the College of Policing has institutionalised EBP through its What Works Centre for Crime Reduction and its partnership with universities (Telep, & Lum, 2014). Police officers are increasingly encouraged to engage with academic literature, participate in pilot evaluations, and use outcome data to refine operational tactics. From a conceptual standpoint, EBP reflects a rational-bureaucratic model of decision-making, where evidence is assumed to be objective, generalisable, and politically neutral. However, critical scholars have cautioned against uncritical adoption of this model, noting that "evidence" is itself socially constructed, often shaped by the questions asked, the data collected, and the interests of those funding or conducting the research (Loader, & Sparks, 2011).

While evidence-based policing offers a clear path toward professionalisation, its implementation in Thailand is significantly shaped by institutional and cultural dynamics. The Royal Thai Police remains a highly centralised and hierarchical organisation, with a strong emphasis on seniority, obedience, and traditional authority structures (Mangkhalasiri, 2024). These features foster a command-and-control environment where innovation and critical reflection are often discouraged, particularly at the frontline level. Moreover, informal patronage networks and bureaucratic inertia can stifle reform, making it difficult to embed research-oriented thinking or support grassroots experimentation with new methods (Berman, 2010). Partnerships between the police and academic institutions are limited and sporadic, with few mechanisms in place for sustained collaboration or mutual capacity building. In this context, the development of data science and EBP practices requires more than technical training – it demands structural changes in incentives, leadership styles, and organisational values that support continuous learning and adaptive problem-solving (Lum, & Koper, 2024).

3.3 Algorithmic Governance: Authority and Accountability in the Age of Code

The deployment of algorithms in policing invites broader questions about how decision-making is being reshaped by automated systems. This is the realm of algorithmic governance – a conceptual framework that examines how power and control are mediated through computational technologies (Amoore, & Piotukh, 2015). In the policing domain, algorithms are increasingly used to inform bail decisions, assess recidivism risk, flag "high-risk" individuals, and determine patrol routes. While often justified as efficient and impartial, these systems are rarely transparent. The logic behind algorithmic decisions is typically hidden in proprietary code or complex statistical models that are inaccessible to the public – and sometimes even to the police officers using them. This phenomenon of "black box" decision-making undermines traditional forms of accountability and due process (Pasquale, 2015). Furthermore, algorithmic governance also raises concerns about the delegation of moral and legal authority. When decisions about freedom, surveillance, or suspicion are shaped by a machine, who is accountable for the consequences? If a predictive tool erroneously labels a suspect or misclassifies a threat, the human actor may defer responsibility to the algorithm, creating a dangerous diffusion of blame. In Thailand, where regulatory frameworks around digital governance are still developing, the risk of unregulated algorithmic expansion is particularly acute. Without robust legal safeguards, public awareness, and institutional oversight, algorithmic tools could be co-opted for surveillance, social control, or political purposes.

3.4 From Ethics to Policy: Embedding Data Justice in Reform Pathways

Finally, the concept of data justice provides an essential normative anchor to the data policing debate. While much of the literature celebrates efficiency, optimisation, and innovation, data justice compels us to ask deeper ethical questions: Whose data are being used? Who gets to decide how they are used? What are the consequences for those whose lives are rendered visible – or invisible – by data systems? Data justice emerged as a response to the "datafication" of social life, where decisions about welfare, security, and citizenship are increasingly mediated by algorithms (Taylor, 2017). It seeks to address distributive injustices (who benefits and who is burdened), procedural injustices (how decisions are made), and representational injustices (how people are categorised or misrepresented through data). In the policing context, data justice demands that systems be designed not only for accuracy and speed, but also for fairness, inclusivity, and respect for rights. This is particularly relevant in settings like Thailand, where marginalised communities – migrant workers, stateless people, ethnic minorities – often exist at the edges of state databases, or are included only through criminalisation. By foregrounding these principles, data justice challenges the techno-solutionist narrative of data science and offers a human-centred vision for responsible innovation.

Moreover, while technical and infrastructural readiness are necessary, they are insufficient without robust "peopleware" – skilled professionals who are both technically competent and ethically grounded. Without this human element, there is a risk that data science becomes a tool for political abuse or misconduct by state actors. To mitigate these risks, Thailand should develop clear and enforceable legal frameworks that regulate how police use data-driven technologies, ensuring transparency, accountability, and protection of civil liberties (Taylor, 2017; Pasquale, 2015).

4. Research Method

This study adopts a qualitative research design grounded in comparative documentary analysis. It draws on policy documents, academic literature, and official reports from five countries, including the United States, the United Kingdom, Singapore, South Korea, and Japan, alongside materials related to the Thai policing context. The analysis focuses on identifying trends, challenges, and good practices in the application of data science in policing. By systematically comparing international and domestic sources, the study aims to highlight lessons relevant for policy development in Thailand.

5. Current Landscape and Strategic Development of Data Science in Thai Policing

This section addresses the first research objective: To examine the current landscape and strategic development of data science in Thai policing. It outlines the current state of data integration within Thai law enforcement, identifying fragmented practices, institutional challenges, and limited strategic planning. The section also introduces emerging reforms and highlights opportunities to strengthen governance and technological capacity in alignment with international models.

Thailand's engagement with data science in policing remains in a nascent stage, marked by fragmented implementation, limited inter-agency collaboration, and a lack of overarching strategic direction. Initial efforts have included the development of digital crime databases, CCTV systems with some real-time analytics capabilities, and digital case management in select urban jurisdictions. However, these tools are often applied in isolation, without integration across provinces or alignment with national-level planning. The Royal Thai Police (RTP) has launched initiatives such as digital crime recording and surveillance enhancement, but these remain largely operational rather than strategic. Data-driven practices are rarely embedded in long-term crime prevention policies or institutional planning processes. As a result, efforts tend to be reactive and unevenly distributed, with some metropolitan areas adopting advanced tools while rural provinces continue to rely on manual and paper-based processes.

Thailand also faces structural challenges. The absence of a national digital policing framework means that data standards, interoperability protocols, and ethical governance guidelines are underdeveloped. Additionally, law enforcement training institutions, such as the Royal Police Cadet Academy, have yet to fully integrate data literacy, research methods, and evidence-based thinking into their curricula. Despite these challenges, there is increasing recognition of the need for reform. High-profile cases of data misuse, coupled with growing demands for accountability and transparency, have spurred dialogue about the ethical use of surveillance technologies and the role of data in supporting public trust. The rise in intentional homicide rates (UNODC, 2024)

and continued low levels of public confidence in police institutions (The Nation, 2023) highlight the urgency for more effective and legitimate policing strategies.

As this paper shows through international comparisons, the experiences of countries like the UK, South Korea, and Japan provide viable models for strategic, ethical, and research-informed integration of data science. Thailand has the opportunity to learn from these examples and build a coordinated, transparent, and community-responsive framework for digital transformation in law enforcement.

6. International Practices in Data-Driven Policing

This section supports the second research objective: To critically analyse the opportunities and challenges in integrating data science into Thailand's law enforcement. By examining five jurisdictions – the United States, United Kingdom, Singapore, South Korea, and Japan – this section draws comparative insights on how different governance systems and socio-political environments have influenced the adoption of data science in law enforcement. These international case studies serve as analytical reference points to better understand the conditions under which data science can succeed or fail, helping to inform Thailand's strategic choices in its own reform efforts. Each case contributes different insights into enabling factors and risks. The U.S. leads in innovation and private-sector collaboration; the U.K. integrates ethics and evidence-based policing; Singapore demonstrates strong central coordination and smart surveillance; South Korea offers robust digital infrastructure and cross-sectoral integration; and Japan reflects a community-oriented, trust-based approach. Together, they offer a comparative lens through which Thailand's emerging challenges and opportunities in data-driven policing can be better understood. Details are presented in the following subsections.

6.1 United States

The United States stands at the forefront of data science innovation in policing, having birthed some of the most influential predictive systems and data-driven management tools. The introduction of CompStat by the New York Police Department (NYPD) in the 1990s revolutionized how police departments conceptualized crime patterns and accountability (Bratton, & Malinowski, 2008). CompStat's model, which focused on mapping crimes, identifying trends, and holding precinct commanders accountable through data dashboards, laid the groundwork for future predictive systems. It normalized a metrics-driven culture in policing – one that prioritizes quantifiable performance indicators and outcomes.

In the 2010s, predictive policing gained momentum across U.S. cities with platforms like PredPol (predictive policing software developed in collaboration with LAPD and academic researchers) and HunchLab. These systems claimed to forecast crime hotspots and allocate resources proactively using historical data, spatial-temporal analysis, and algorithmic modelling (Perry et al., 2013). Simultaneously, departments like the Chicago Police Department piloted the Strategic Subject List (SSL) to identify individuals at high risk of perpetrating or falling victim to gun violence based on network analysis. However, this technological leap was accompanied by profound ethical, social, and legal controversies. Scholars and civil society organizations raised concerns about algorithmic bias, particularly how historical data – collected through decades of racially biased practices – reinforced structural inequalities (Lum, & Isaac, 2016). For example, predictive systems disproportionately flagged Black and Latino neighborhoods as "high risk," resulting in intensified surveillance and over-policing of already marginalized populations (Brayne, 2021). Furthermore, critics noted the opacity of proprietary algorithms, where even law enforcement officials could not fully explain how risk scores were generated, eroding transparency and accountability (Pasquale, 2015).

Several high-profile controversies contributed to a public backlash. The LAPD was forced to shut down its predictive policing programmed in 2020 after investigations revealed a lack of oversight, unclear evaluation metrics, and community mistrust (Poston, 2020). Similarly, the Chicago SSL was discontinued after studies revealed minimal impact on crime and unclear legal justifications for its use (Saunders et al., 2016). Another structural factor that complicates the U.S. approach is its decentralized policing system – over 18,000 separate agencies operating with significant autonomy. This fragmentation leads to variability in data quality, ethical standards, and technical capacity. While some major cities have access to cutting-edge analytics and dedicated crime labs, smaller or rural departments may lack the resources or expertise to implement even basic data systems. Nonetheless, the United States remains a critical case study in the promises and perils of data-driven policing. It demonstrates the power of innovation, particularly when supported by research partnerships (e.g., between RAND

Corporation and police departments), but also underscores the risks of deploying technology without adequate ethical guardrails. For countries like Thailand, where public trust in law enforcement is fragile and data governance still developing, the American case is both inspirational and cautionary.

6.2 United Kingdom

The United Kingdom represents one of the most structured and theoretically grounded approaches to data-driven policing, marked by its emphasis on evidence-based practices, institutional support for ethical data use, and a growing commitment to algorithmic accountability. Unlike the decentralised model of the United States, the UK's more unified policing structure – particularly in England and Wales – has enabled a coordinated national strategy around policing reform, including the development of central institutions that actively promote data science integration.

The UK's adoption of Evidence-Based Policing (EBP) has been internationally recognised as a pioneering model. Championed by criminologist Lawrence Sherman, EBP argues that policing decisions should be grounded in rigorous research, experimental methods, and empirical evidence rather than tradition, intuition, or anecdote (Sherman, 2013). The model gained traction within British policing through the creation of the College of Policing, a statutory body that promotes professionalism, training, and research literacy within the police force. Through partnerships with academic institutions, initiatives such as the What Works Centre for Crime Reduction and the Society of Evidence-Based Policing have embedded research-based thinking into operational decision-making. Police officers are now increasingly trained not only to consume research but also to participate in experimental design, field trials, and impact evaluations (Telep, & Lum, 2014). EBP in the UK is not simply about data collection – it reflects a culture of reflective practice, where learning from evidence is formalised within organisational routines. What makes the UK model distinct is the institutionalisation of EBP – it is not left to individual departments to experiment with data science in isolation, but rather embedded through national strategies, funding mechanisms, and professional development pathways. This has enabled the UK to move beyond ad hoc innovation toward system-level transformation.

Alongside its advancements in EBP, the UK has also explored the use of algorithmic and AI-based systems in policing, including facial recognition, automated number plate recognition (ANPR), and risk assessment tools. One of the most controversial applications has been the deployment of Live Facial Recognition (LFR) technology by the London Metropolitan Police, which has been used to scan faces in real-time at public events and high-footfall locations. The implementation of such tools has prompted robust public debate and legal challenges, particularly around proportionality, consent, and accuracy. Civil liberties groups such as Big Brother Watch and the Liberty organisation have criticised these practices for undermining privacy rights and disproportionately affecting ethnic minorities, citing studies that found higher error rates for non-white faces (Babuta, & Oswald, 2021). Responding to these concerns, UK institutions have taken steps toward algorithmic governance. The Centre for Data Ethics and Innovation (CDEI), under the Department for Science, Innovation and Technology (DSIT), has issued recommendations for public sector use of algorithmic tools, advocating for transparency, explainability, and human oversight in high-risk applications. Furthermore, police forces are encouraged to conduct Algorithmic Impact Assessments (AIAs) and publish information on their use of predictive or biometric technologies.

One of the UK's key strengths lies in its ongoing effort to balance innovation with legitimacy. Unlike jurisdictions that adopt surveillance tools with little public consultation, UK police are required to justify their methods through public interest tests, data protection principles under the UK GDPR, and oversight from bodies such as the Information Commissioner's Office (ICO) and Her Majesty's Inspectorate of Constabulary and Fire & Rescue Services (HMICFRS). This level of ethical self-regulation and external accountability offers important lessons for countries like Thailand, where surveillance technologies are increasingly deployed without robust public dialogue or legal protections. The UK's model suggests that transparency is not antithetical to security – in fact, it can enhance institutional trust, improve the quality of decision-making, and create a foundation for democratic policing in the digital age.

Furthermore, The UK case holds particular relevance for Thailand's aspirations toward data-driven policing. First, the integration of EBP suggests that technology should not precede organisational learning. Training police officers in critical thinking, research methods, and data ethics is essential if data science is to be meaningful and sustainable. Second, the UK's cautious and reflective approach to algorithmic tools shows that

not all innovations should be adopted uncritically – evaluation, regulation, and stakeholder engagement are prerequisites for responsible implementation. Also, the UK's experience illustrates that the legitimacy of data systems depends as much on process as on outcome. In Thailand, where public trust in police institutions has often been contested, adopting transparency protocols, community engagement strategies, and human rights-based design principles could help ensure that data science strengthens, rather than undermines, democratic policing.

6.3 Singapore

Singapore presents a compelling case of state-led technological integration in policing, underpinned by a strong tradition of technocratic governance, strategic planning, and institutional coherence. As a key component of its broader Smart Nation initiative, the Singaporean government has actively incorporated data science, artificial intelligence (AI), and digital surveillance into public administration – including law enforcement (Zhang, 2021). The result is a model of policing that is highly centralised, technologically advanced, and responsive, but also one that raises ongoing concerns about the balance between security and civil liberties. The Singapore Police Force (SPF) has adopted a holistic approach to integrating data science across all levels of policing (Lim, 2018). Key components include:

- PolCam 2.0: An extensive network of police-operated CCTV systems with real-time analytics capabilities deployed throughout high-traffic public spaces. These systems use facial recognition, crowd analysis, and behavioural anomaly detection to assist officers in real-time surveillance and incident response.
- Digital Investigation and Forensics Tools: SPF's Digital Forensics Laboratory uses machine learning and natural language processing to analyse seized devices, extract digital evidence, and reconstruct criminal timelines.
- Crime Risk Prediction Models: The SPF has developed internal risk modelling systems to identify geographic and temporal crime hotspots, informing patrol deployment and resource allocation.
- Smart Command and Control Centres: These integrate live data feeds from multiple agencies – transport, health, urban planning – allowing coordinated response to both routine crime and public emergencies.

These tools are embedded within a whole-of-government ICT infrastructure, coordinated by the Government Technology Agency (GovTech). Cross-agency data-sharing is facilitated by platforms such as the Singapore Government Tech Stack, enabling real-time information exchange between law enforcement, immigration, transportation, and public health agencies. This infrastructure allows for predictive, preventive, and real-time policing, and reflects Singapore's broader ideology of surveillance as a public good. The government's ability to build and sustain public trust has been pivotal to the societal acceptance of its data-intensive policing practices (Rodan, 2014). Furthermore, Singapore's data governance is managed under frameworks such as the Personal Data Protection Act (PDPA) and the Computer Misuse and Cybersecurity Act, which provide general provisions for data use and cybercrime investigation. However, these frameworks are often seen as state-centric, with wide discretion granted to authorities. While the SPF does not typically release detailed information on algorithmic operations, oversight is conducted through internal reviews and inter-agency committees, rather than independent civilian oversight bodies (Rahman, 2021). Unlike countries with strong legal traditions of freedom of information or public protest, Singapore adopts a paternalistic model of governance, wherein the state claims legitimacy through performance and order rather than procedural transparency. As such, the ethics of data science deployment in policing is framed through a security-first lens.

Singapore's efficiency in deploying data-driven policing is globally admired – crime rates are low, public spaces are highly regulated, and emergency response systems are among the fastest in the world. Yet, this comes at a cost. Critics point to the erosion of privacy, the potential chilling effect on public expression, and the lack of legal recourse for citizens subject to algorithmic surveillance or profiling (Lim, 2018; Rodan, 2014). Civil society actors have limited influence over public security policy, and independent academic research on policing practices remains sparse due to restrictions on political expression. Consequently, while the SPF represents a technological ideal, it also embodies an authoritarian model of surveillance, where dissent is discouraged and accountability mechanisms are minimal.

Singapore's success lies in its institutional alignment – where data infrastructure, policy vision, and organisational capacity operate in harmony. For Thailand, the lesson is not to replicate the top-down surveillance model, but rather to understand how technological integration requires strong foundational systems: unified

databases, legal frameworks, and inter-agency protocols. Furthermore, Thailand must weigh civil liberties and political culture in any technological adoption. While the SPF can deploy facial recognition with little public pushback, such an approach may be untenable or counterproductive in Thai society, where trust in public institutions is more fragile and political accountability more contested. Thus, Singapore offers a powerful yet cautionary tale: innovation is most effective when aligned with institutional capacity, but also when tempered by ethical governance and civic participation.

6.4 South Korea

South Korea is often recognised as one of the most technologically advanced societies in the world, with high-speed internet penetration, widespread smartphone use, and a strong digital innovation ecosystem. These features have enabled the country to embed data science into public sector services, including law enforcement. In recent years, South Korea has developed and implemented a "Smart Policing" strategy, combining real-time surveillance, big data analytics, and artificial intelligence (AI) to enhance crime prevention and response capabilities (Joh, 2019). The foundation of South Korea's data-driven policing is its national ICT infrastructure, which connects police, government ministries, local governments, and private platforms. The National Police Agency (NPA) operates integrated systems such as:

- Crime Prevention Information System (CPIS): A platform that collects data from CCTVs, patrol records, emergency calls, and incident reports to generate predictive insights about high-risk areas and times.
- Smart Policing System: This includes mobile platforms for frontline officers, real-time crime data dashboards, and AI-enhanced command centres that coordinate responses across agencies.
- Integrated Dispatch Systems: These systems enable quick coordination between police, fire, and emergency medical services through shared digital channels.
- CCTV Network with AI Surveillance: The use of machine learning in video surveillance allows for the detection of suspicious behaviour patterns, abandoned objects, and crowd anomalies.

The success of these systems is facilitated by a cooperative model between government and industry. Major Korean tech firms such as Samsung, KT, and SK Telecom work alongside public agencies to develop AI and analytics tools, reflecting a public–private partnership (PPP) model of innovation.

While South Korea has embraced the technological promise of smart policing, it has also faced pressure to address issues of data protection and privacy, particularly in response to high-profile data breaches and public concern about government surveillance. The Personal Information Protection Act (PIPA), initially enacted in 2011 and amended several times since, has become the country's primary legislation on data governance. Under the latest amendments, public institutions – including the police – are required to conduct impact assessments before deploying new data-driven tools and to ensure transparency, consent mechanisms, and independent oversight (McDaniel, & Pease, 2021). Furthermore, the Korean National Human Rights Commission has issued guidelines on AI ethics in public administration, including policing, highlighting the need to prevent algorithmic discrimination and to ensure fairness in automated decision-making processes. Nevertheless, tensions remain. Critics argue that legal reforms are not yet fully aligned with practice. Surveillance continues to expand rapidly, often outpacing regulatory safeguards. This "innovation first, governance later" pattern poses potential risks for civil liberties, especially in areas such as facial recognition and crowd control during protests.

South Korea also stands out for its efforts to bridge research and practice. The NPA actively funds criminological research and collaborates with academic institutions to evaluate new technologies and policing strategies (Joo, 2015; Belknap, 2016). For example, the Korean Institute of Criminology and Justice (KICJ) serves as a national think tank that conducts policy analysis and offers guidance on technology integration in policing (Han et al., 2022). These collaborations help ensure that data science is not merely a technical add-on, but is contextualised within broader criminological theories, ethical debates, and empirical evaluation. Moreover, the rise of "digital policing" as an academic field in Korean universities has contributed to the development of a new generation of data-literate police officers and analysts (Moon et al., 2017; Brown, 2020; Kim, 2016). Thailand can draw several important lessons from South Korea's experience:

- National Coordination is Critical: Korea's success is underpinned by central planning and digital interoperability. Thailand may need to develop national standards and interoperable systems across provinces and agencies to enable meaningful data sharing.

- Build Ethical Governance in Parallel: Rather than waiting for scandals or rights violations, Thailand should prioritise the proactive development of data protection laws and AI ethics guidelines, especially as data use becomes more automated.
- Invest in Capacity and Research Translation: Korea's model of police–university collaboration and officer training in data interpretation can be adapted to the Thai context to ensure meaningful and responsible technology use.
- Guard Against Over-Surveillance: The expansion of data tools should not come at the expense of civil liberties. Thailand should be wary of adopting surveillance-heavy models without corresponding oversight.

South Korea's case demonstrates that technological advancement and democratic governance can coexist, but only with deliberate investment in legal frameworks, institutional checks, and public engagement.

6.5 Japan

Japan offers a distinct model of policing in the digital age – one characterised by gradual, measured adoption of technology, strong emphasis on community trust, and deep-rooted cultural sensitivities toward surveillance and privacy. While less aggressive in its use of data science compared to some of its East Asian neighbours, Japan has integrated digital technologies into law enforcement in ways that reflect its institutional conservatism and societal values (Yamamoto, 2021; Broadhurst et al., 2018).

A defining feature of Japanese policing is its community-based model, particularly the kōban system – a network of small, local police boxes staffed by officers who maintain close ties with residents. Officers stationed at kōban engage in foot patrols, neighbourhood visits, and community mediation. This model promotes proactive crime prevention and fosters high levels of public trust (Bayley, 1991; Johnson, 2002). Rather than replacing human judgment with automated systems, Japan has taken a complementary approach**,** using technology to support – rather than substitute – interpersonal policing. For example, officers use tablet-based systems for data entry and reporting during patrols, and precincts share crime statistics and alerts through real-time digital communication networks (Yamamoto, 2021). However, the emphasis remains on the officer's discretion, local knowledge, and face-to-face interaction, reflecting a philosophy of policing rooted in personal trust rather than algorithmic authority.

Japan's National Police Agency (NPA) has implemented several digital initiatives in recent years, including:
- Automated Case Management Systems to improve information sharing across jurisdictions (NPA, 2024).
- Criminal Information Analysis Centres, which apply statistical modelling to identify crime trends and monitor organised crime networks (Broadhurst et al., 2018).
- Cybercrime Countermeasures, which involve AI-assisted monitoring of the dark web, phishing attacks, and digital fraud (NPA, 2024).
- Facial Recognition Technology, used mainly at international ports of entry and within immigration systems, rather than for routine public surveillance (Yamamoto, 2021).

However, the use of predictive policing, algorithmic profiling, or real-time facial recognition in public spaces remains limited. This deliberate restraint is not due to a lack of technological capacity – Japan is a global leader in robotics and AI – but rather reflects a normative stance that values privacy, consent, and procedural legitimacy (Shimpo, 2023).

Japan's incremental approach is also influenced by institutional dynamics. The police bureaucracy is hierarchical and risk-averse, with innovation often occurring within tightly controlled pilot programmes (Johnson, 2002). There is no dominant culture of technological experimentation akin to the startup–police collaborations seen in the U.S. Instead, change is usually driven by internal reviews or national-level strategic planning (Yamamoto, 2021).

Culturally, Japanese society places a premium on privacy, discretion, and social harmony (wa). Public resistance to surveillance is strong, particularly in the wake of past incidents involving unauthorised data access by government bodies. This creates a high threshold for public legitimacy, which police agencies must meet before rolling out invasive technologies (Miyashita, 2022). Moreover, civil society – including academics, journalists, and legal professionals – plays an active role in scrutinising policing practices. Public debate on the use of technology in law enforcement is framed not only in terms of efficiency, but also in terms of democratic values and institutional ethics (Yamamoto, 2021). Japan's model offers vital lessons for Thailand, especially in terms of:

- Trust-Centric Approaches: Like Japan, Thailand has deep traditions of interpersonal policing and informal resolution. Integrating data science in a way that supports – not supplants – these practices could preserve community trust while enhancing operational effectiveness.
- Incremental Implementation: Japan's methodical and evaluative stance towards technology adoption aligns well with Thailand's current capacity. Avoiding "big bang" implementations may be preferable to reduce risk and resistance.
- Balancing Tradition and Innovation: Thailand, like Japan, values hierarchical order and cultural harmony. Embedding data science within existing bureaucratic and cultural logics – rather than imposing foreign models – may yield more sustainable reforms.
- Emphasising Legal and Ethical Infrastructure: Strong legal standards such as APPI ensure public confidence in Japanese policing. Thailand would benefit from similar legislation and independent oversight mechanisms, particularly as surveillance tools become more pervasive.

Japan's experience demonstrates that data science in policing does not require radical disruption. Instead, its gradual, dialogic, and trust-based integration shows how countries can adapt technology to fit their institutional character and social compact (Broadhurst et al., 2018).

7. Opportunities and Challenges for Data Science in Thai Policing

This section also supports the second research objective. It outlines both the enabling potentials and structural limitations that influence how data science can be operationalised within the Thai policing context. Drawing on global evidence and domestic realities, it identifies areas of strategic advantage as well as institutional and legal barriers that should be addressed.

7.1 Opportunities

7.1.1 Enhancing Resource Allocation and Operational Efficiency

The integration of data science into policing presents a significant opportunity to enhance the efficiency of resource allocation and operational planning. Predictive analytics, geospatial mapping, and algorithmic forecasting allow law enforcement agencies to anticipate crime trends and target high-risk areas more effectively (Perry et al., 2013; Meijer, & Wessels, 2019). These tools help shift policing strategies from reactive to proactive, optimising deployment patterns based on both historical data and real-time inputs. In practice, data systems such as CompStat have illustrated the value of performance-based metrics and spatial intelligence in improving policing outcomes (Bratton, & Malinowski, 2008). The application of such models in Thailand could support better coordination across police jurisdictions, reduce response times, and maximise the impact of limited resources - particularly in high-crime districts or areas lacking adequate coverage. Approaches such as hotspot policing and CompStat have demonstrated positive results in reducing crime when combined with problem-oriented strategies (Weisburd et al., 2010). Their success lies in harnessing data to identify recurring patterns and inform targeted interventions, which, if adopted in Thailand, could enhance strategic decision-making within the Royal Thai Police and enable more focused allocation of personnel and assets.

7.1.2 Supporting Evidence-Based Decision-Making

Data science also strengthens the institutionalisation of evidence-based policing (EBP), a model that relies on rigorous empirical research to inform operational and policy decisions. EBP contrasts sharply with traditional practices grounded in intuition or hierarchical orders and instead promotes the use of experimental designs, outcome evaluations, and academic-practitioner collaboration (Sherman, 2013). Globally, the rise of EBP has transformed police culture in countries such as the UK, where institutions like the College of Policing and the What Works Centre have fostered partnerships between police forces and researchers (Telep, & Lum, 2014). These developments align with broader efforts to professionalise policing through systematic knowledge production and evaluation.

In Thailand, the integration of academic research into police decision-making remains limited. However, embedding EBP principles into training institutions such as the Royal Police Cadet Academy could help establish a research-informed culture. As Lum, and Koper (2017) argue, EBP enables policing organisations to move from reactive enforcement to proactive problem-solving, offering strategic advantages and fostering more legitimate practices grounded in effectiveness rather than tradition.

7.1.3 Improving Public Trust and Accountability

The ethical implementation of data-driven policing tools can improve public trust and institutional accountability – particularly in contexts where confidence in law enforcement is low. As Brayne (2021) highlights, digital data systems, when used transparently, can enhance internal monitoring, improve documentation practices, and create accountability mechanisms that limit opportunities for abuse. These systems can produce audit trails, track officer conduct, and standardise decision-making processes, thereby supporting internal investigations and reinforcing procedural fairness.

The importance of procedural justice – where individuals perceive they are treated fairly and with respect – has been shown to significantly impact public trust in the police (Tyler, 2006). By enabling standardised decision-making and reducing discretionary bias, data science can contribute to fairer outcomes. However, this depends on institutional safeguards and clear governance frameworks. Without such safeguards, data tools can become instruments of over-surveillance, particularly against marginalised populations (Longworth, 2021; Ferguson, 2017). Thus, transparency, accountability, and human rights considerations must be central to Thailand's data science integration strategy if it is to build legitimacy and maintain public confidence.

7.1.4 Strengthening Multi-Agency Collaboration

Crimes involving human trafficking, cybercrime, and organised networks often require collaboration across multiple state and non-state actors. Data science provides the technical foundation for enhanced multi-agency cooperation through interoperable systems, shared databases, and real-time information exchange. For instance, smart policing frameworks in countries like South Korea and Singapore rely heavily on integrated platforms that connect law enforcement with other government departments (Joh, 2019; Zhang, 2021). These cross-sectoral infrastructures facilitate joint decision-making, improve emergency response times, and ensure holistic case management.

In Thailand, where trafficking in persons frequently involves overlapping responsibilities among police, immigration, and social welfare services, data science could play a critical role in breaking down institutional silos. As Farrell et al., (2015) emphasise, the success of victim identification and trafficking investigations depends heavily on communication and trust between agencies. Integrated platforms could help harmonise protocols, reduce redundancy, and ensure timely support for vulnerable populations – particularly migrant children, ethnic minorities, and stateless individuals. Moreover, leveraging data to support inter-agency coordination could reinforce Thailand's commitments under regional and international anti-trafficking frameworks, while enhancing institutional responsiveness and efficiency.

7.2 Challenges

7.2.1 Fragmented Data Infrastructure

One of the most pressing challenges facing the adoption of data science in Thai policing is the fragmentation of data systems across different agencies and jurisdictions. Unlike countries with centralised digital infrastructure and interoperability protocols, Thailand lacks a unified architecture that allows seamless data sharing between police departments, ministries, and support agencies. This fragmentation significantly hinders real-time data analysis, predictive modelling, and collaborative case management, reducing the overall efficacy of data-informed strategies (Lum, & Koper, 2017). For instance, while some urban police stations may operate digital case management tools or CCTV analytics, these systems are often not synchronised with national databases or accessible across provinces. This lack of integration impedes the development of standardised practices and makes it difficult to coordinate responses to trans-regional or organised crime threats. The absence of shared platforms also limits the potential of predictive tools, which rely heavily on large, consistent, and clean datasets to generate accurate insights (Perry et al., 2013; Meijer, & Wessels, 2019). In contrast, countries like South Korea and Singapore have demonstrated how centralised infrastructures can drive national-level coordination and enable intelligent policing at scale (Joh, 2019; Zhang, 2021). Without a coherent data ecosystem, Thailand risks reinforcing silos and undermining the transformative potential of data science.

7.2.2 Organisational Culture and Resistance to Change

The successful integration of data science into policing is not merely a technological issue – it is fundamentally about organizational transformation. Police institutions are traditionally hierarchical, rules-based, and resistant to change, especially when innovations are perceived as undermining existing authority structures or professional discretion (Chan, 1996). In Thailand, where decision-making is often centralised and top-down – whether in policing more broadly (Poothakool, & Glendinning, 2013; Poothakool, 2014), in law enforcement and public health approaches (Poothakool, & Meephiam, 2022), or in human trafficking investigations (Mangkhalasiri, 2024) – the introduction of data-driven methods may be met with scepticism or passive resistance from officers unfamiliar with research-led approaches.

This resistance is compounded by limited exposure to empirical research and critical thinking in police training. As Brayne (2021) and Loader, and Sparks (2011) argue, data science introduces new logics of control – statistical, probabilistic, and algorithmic – that may challenge conventional notions of authority and field discretion. Officers may be wary of being monitored or evaluated by metrics they do not understand or control, leading to low uptake or misapplication of tools. Moreover, there is a risk of overreliance on digital outputs without the capacity to interpret them critically, especially in environments where professional development is uneven. Addressing this challenge requires cultural change, leadership engagement, and the institutionalisation of data literacy as a core competency.

7.2.3 Legal and Ethical Concerns

The use of data science in policing raises important legal and ethical questions, particularly in contexts where regulatory frameworks are underdeveloped. Thailand currently lacks comprehensive legislation governing the collection, use, and oversight of algorithmic tools, predictive models, or biometric surveillance. This regulatory vacuum creates significant risks for civil liberties, including the potential for discrimination, wrongful profiling, and unauthorised data sharing (UNODC, 2024; Ferguson, 2017).

Technologies such as facial recognition or risk scoring systems, when deployed without adequate safeguards, can amplify systemic inequalities and erode public trust. As Longworth (2021) notes, algorithmic systems often encode historical biases, particularly when trained on flawed or incomplete data. In the absence of legal mandates for transparency or explainability, decision-making may become opaque and unaccountable – a phenomenon Pasquale (2015) describes as the rise of the "black box society." Furthermore, Thailand's political landscape, where security imperatives often override privacy protections, raises concerns that data science could be misused for social control or political surveillance, rather than public safety. These issues underscore the urgent need for ethical guidelines, impact assessments, and independent oversight mechanisms before data-driven tools are scaled up.

7.2.4 Resource and Capacity Gaps

Another major constraint on Thailand's ability to adopt data science in policing is the uneven distribution of resources and technical capacity across the country. While some centralised units or urban police departments may benefit from access to digital tools and trained personnel, rural and under-resourced stations frequently lack basic infrastructure, such as internet connectivity, secure data storage, or analytical software. This digital divide threatens to exacerbate existing inequalities between regions and limit the scalability of national initiatives (Lum, & Koper, 2017). Moreover, the effective use of data tools requires a skilled workforce capable of interpreting outputs, designing interventions, and evaluating outcomes. These competencies are still rare within Thai policing institutions, where training curricula are often outdated and research is not embedded into professional development pathways. Without sustained investment in capacity-building – both human and technical – the introduction of data science may remain superficial or reinforce existing dysfunctions. The experience of countries like South Korea shows the value of long-term partnerships with academic institutions, dedicated funding for digital innovation, and structured training programmes to build internal expertise (Joh, 2019). Thailand should adopt a similar multi-pronged strategy if it is to move beyond pilot projects and towards institutional transformation.

7.3 Navigating the Path Forward

The literature indicates that successful integration of data science in policing is contingent upon institutional learning, ethical governance, and public engagement. Thailand must avoid viewing data tools as technical fixes and instead invest in building a policing culture grounded in evidence, transparency, and accountability (Brayne, 2021; Tyler, 2006). Drawing on lessons from international contexts, Thailand's path forward should involve the co-creation of a national framework for data-informed policing, involving police leadership, civil society, academics, and policymakers. A balanced approach that values research and procedural justice while recognising on-the-ground challenges is necessary. As Farrell et al., (2015) caution, laws and tools alone are insufficient without changes in practice and inter-agency cooperation.

8. Recommendations

This section addresses the third research objective: To propose recommendations to the Thai government for the development of data science policy in policing. Drawing from the lessons and analyses of previous sections, it presents a forward-looking roadmap to guide the ethical, strategic, and sustainable integration of data science into Thai law enforcement. The recommendations below incorporate the strengths and best practices observed in the international landscape while responding directly to the Thai context.

8.1 Establish a National Framework for Data-Informed Policing

A clear and comprehensive national strategy should be developed to guide data-informed policing in Thailand. This strategy should outline goals, ethical standards, and operational protocols for data-driven policing. Lessons from the United Kingdom are especially relevant here. The UK's coordinated national strategy, spearheaded by the College of Policing and the Centre for Data Ethics and Innovation, provides a model for integrating ethical standards and interoperability into law enforcement (Sherman, 2013; Babuta & Oswald, 2021). Similarly, South Korea's national ICT infrastructure, which connects law enforcement with other public services, offers insight into the importance of digital interoperability and strategic coordination (Joh, 2019). Thailand can benefit from adopting a similar centralised planning framework while ensuring inclusive stakeholder engagement – including police, policymakers, academics, and civil society – to build legitimacy and long-term sustainability (Tyler, 2006).

8.2 Invest in Capacity Building and Research-Led Training

To embed a culture of evidence-based policing, sustained investment in capacity building is required across all levels of Thai law enforcement. This includes integrating data science, critical thinking, and research methodology into police training curricula, especially at institutions such as the Royal Police Cadet Academy. Officers should be trained not only to use tools but to understand the research that underpins them. This supports both operational effectiveness and reflective practice. Experiences from the UK and US highlight that police receptivity to evidence is strengthened through institutional support, mentoring, and continuing professional development (Lum, & Koper, 2017; Telep, & Lum, 2014). Building a knowledge-informed profession is key to sustaining innovation in Thai policing.

8.3 Promote Ethical Use of Surveillance and Predictive Technologies

As predictive tools, facial recognition, and other surveillance technologies gain traction in Thailand, it is vital to ensure ethical and legal frameworks are established. The UK experience with facial recognition and algorithmic impact assessments demonstrates the importance of transparency and independent oversight (Babuta, & Oswald, 2021). Similarly, South Korea's Personal Information Protection Act (PIPA) and AI ethics guidelines show how ethical governance can be embedded early in the innovation process (McDaniel, & Pease, 2021). Thailand should prioritise the development of data protection laws and independent auditing systems to ensure fairness and protect civil liberties (Brayne, 2021; UNODC, 2024).

8.4 Encourage Organisational Reform to Support Innovation

Organisational change is critical for integrating data science into Thai policing. Cultural resistance and hierarchical inertia remain major challenges (Chan, 1996). The United States case illustrates both innovation and caution: while programs like CompStat and PredPol fostered accountability, they also revealed risks of over-

policing and algorithmic opacity (Bratton, & Malinowski, 2008; Pasquale, 2015). The UK's national-level reforms highlight how institutional change can be incentivised through professional development, performance frameworks, and leadership training. Thailand should build incentive systems that reward transparency, experimentation, and cross-rank collaboration.

8.5 Foster Multi-Sectoral and Academic Partnerships

Collaborations between police, universities, and civil society have been central to effective data-driven policing globally. The US's RAND partnerships and the UK's What Works Centre offer models for embedding research into practice (Perry et al., 2013; Sherman, 2013). South Korea's national think tanks, such as KICJ, and public–private innovation with major tech firms also provide replicable frameworks (Han et al., 2022). Thailand should formalise these partnerships through co-funded pilot projects, embedded researcher programmes, and joint training modules to ensure tools are contextually grounded and ethically sound (Farrell et al., 2015).

8.6 Pilot and Scale Through Contextualised Implementation

Rather than adopting foreign models wholesale, data-driven policing in Thailand should prioritise incremental and locally tailored innovation. Small-scale pilot programmes – such as predictive patrol in selected high-crime areas or AI-supported case triaging – should be implemented with rigorous evaluation frameworks. These pilots allow for learning, adaptation, and risk mitigation before national scaling. Successful international experiences suggest that problem-oriented policing, when combined with community engagement and data insights, can yield substantial gains (Weisburd et al., 2010). Thai implementation should therefore be grounded in local realities while learning from global evidence.

The future of policing in Thailand should not be driven solely by tools, but by values: legitimacy, transparency, and justice. With the right strategies and partnerships, data science can serve as a catalyst for building public trust and enhancing safety across Thai society. These policy recommendations provide a roadmap toward such a transformation – one where technological innovation is balanced with democratic accountability, and where data is used not only to predict crime but to promote fairness, equity, and institutional reform. As Taylor (2017) argues, truly just data systems must prioritise social inclusion and ethical governance to avoid reproducing existing inequalities and marginalisations.

9. Conclusion

This paper has critically examined the emerging role of data science in Thai policing, mapping its current status, identifying key opportunities and challenges, and offering strategic policy recommendations informed by international practices. While Thailand has initiated important steps toward digital transformation in law enforcement, these efforts remain fragmented and lack a coherent national strategy. Comparative insights from jurisdictions such as the United States, United Kingdom, Singapore, South Korea, and Japan illustrate that effective integration of data science into policing is not only a technological challenge but a deeply institutional and ethical one. To ensure success, Thailand should adopt a holistic approach that balances innovation with transparency, builds internal capacity, and fosters collaboration across sectors. The pathway forward lies in creating a national framework that embeds data ethics, promotes inclusive reform, and leverages evidence for policy and operational decisions. With sustained political commitment, institutional reform, and public engagement, data science can serve as a transformative tool in building a more accountable, effective, and trusted policing system in Thailand.

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