

## Factors Affecting Biometrics Using for Crime Control: Case Studies from Police Stations in Thailand

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### Abstract

*This study aimed to examine the situation and analyze problems in law enforcement using biometrics for crime control and to study the success factors affecting efficiency and effectiveness in policymaking. The concepts and models of Van Meter and Van Horn (1975), Paul Sabatier and Daniel Mazmanian (1980), Lipsky (1980), Berman and McLaughlin (1977), Collaborative Governance, efficiency and effectiveness were employed in this study. This was qualitative research using in-depth interviews and a focus group discussion. The key informants included police officers, the public, and scientists. For the qualitative analysis, content analysis, typology, and taxonomy analysis were employed. The research findings revealed that the problems in law enforcement using biometrics for crime control included the lack of supporting laws for officers' authorities to collect biometric databases, explicit responsibilities, personnel, budget, equipment, and integration and exchange of data between agencies. Therefore, for a successful policy, the Royal Thai Police must prioritize management, big data, innovation, and public satisfaction with the policy. The development aims to create innovations in law enforcement to enhance efficiency and effectiveness in public administration.*

**Keywords:** Law Enforcement, Biometrics, Crime Control, Innovation, Public Administration.

### Introduction

In Thailand, police officers hold the authority to investigate criminal cases. Criminal investigation is a major legal process to bring criminals to justice. Police officers are state officials who uphold the law and also maintain peace and order in society. They prevent and suppress crime, and enforce the law. Therefore, the administration of the Royal Thai police is a monopoly in the bureaucracy. The government operates it without interference from the private sector. Since the police hold the authority to provide public services to the public in terms of the safety of life and property, effective and efficient law enforcement is crucial.

The Royal Thai Police holds juristic person status (Office of the Council of State, 2015) under the supervision of the Prime Minister or an assignee. It can be divided into central, regional, and local government agencies. This includes operational agencies (police stations) which are established and spread throughout Thailand. They have assigned tasks and missions according to their authority and duties and divided areas of responsibility for performing duties according to missions and laws. Therefore, they have a close relationship with the people's way of life and the peace and order of society. Police stations are present in every area, covering the entire country. A police station has 5 types of work: administrative work, crime prevention and suppression, investigation, inquiry, and traffic. Police stations in Bangkok are called "Metropolitan police stations" while police stations in other provinces are called "Police stations". At present, the Royal Thai Police has been using development plan for law enforcement according to the 20-years Royal Thai Police Strategy (2018-2037) in Strategy 2: Enhancing the Potential of Law Enforcement (Strategy Division Office of Police Strategy, 2019).

At present, the situation of crime in Thailand has a lot going on. Traditional methods of crime control are not enough to control crime. In addition, the United States, the United Kingdom, and countries in Europe, all of which utilize biometrics for crime control within their countries (Peter M. Schneider & Peter D. Martin, 2000). DNA evidence undoubtedly plays a key role in solving crimes (Thibedeau, 2014). If the law enforcement policy is not effective and efficient without innovations in providing effective services or good

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policies to keep up with the advancement, crime control will not be effective. If left ignored, such problems may cause unrest in society. Therefore, a law enforcement development enhances the efficiency and effectiveness of police operations, and the Royal Thai Police must urgently fix and improve law enforcement at all times.

Biometrics is the biological data of individuals representing the identity of each person. The types of biometrics can be divided into 2 types (Kizza J.M., 2010). Biometrics related to physical characteristics, such as fingerprints, hand geometry, voice, retina, facial biometrics, blood type, or DNA, etc. and biometrics related to an individual's behavior, such as handwriting analysis, cards or information cards, etc. Biometrics is used in law enforcement, identification of individuals in criminal offenses, prevention of wrongful arrest and providing justice to the people. It enhances the work process to be efficient and respond to the needs of the people. Biometrics is an innovation that has become popular in verifying individual identity since it is accurate and has fewer errors, which will create fairness to enhance the efficiency of law enforcement by police officers. Due to the benefits of biometrics, it has been employed for crime control.

This study aimed to examine the situation and analyze problems in law enforcement using biometrics for crime control to present the policy law enforcement model of the Royal Thai Police as a guideline for police stations.

## Literature Review

The theories and concepts related to “Factors Affecting Biometrics Using for Crime Control” were studied as a conceptual framework for the research as follows:

### *Strategies, Policies and Concepts*

#### *National Strategy (2018-2037)*

The National Strategy for Balancing and Developing the Public Sector Management (Office of the National Economic and Social Development Board, 2018) mainly aims to make the public sector to adhere to the principle of “the Public Sector of the People, for the People and for the Public Interest” by providing services based on the principles of good governance, adjusting the work culture to prioritize results and public interest.

#### *Thailand 4.0 Policy*

“Thailand 4.0” aims to adjust the system and the direction and determine the strategy for development under the concept of “Stability, Prosperity, and Sustainability” (The Royal Thai Government, 2014).

#### *20-years Strategy of Royal Thai Police (2018- 2037)*

This strategy aims to enhance the potential for law enforcement, criminal justice, and service provision to the public equally and fairly. A database is developed and modern technology is applied to control crimes and increase law enforcement efficiency, including the development of a database and linking forensic science databases as well as integration with agencies in the justice process and other relevant agencies both domestically and internationally. E-government is used to provide services to citizens through electronic systems (Abu-Shanab et al., 2019), develop database systems, link data between government agencies, and data exchange, allowing government agencies to administer government work or management efficiently and effectively. This can respond to the needs and expectations of the public (Brown, 2005).

#### *Theory of Public Policy*

Activities carried out by the government cover all types of government activities (Sharkansky, 1970). What the government chooses to do or not to do in which the government chooses to act will cover various

activities all of the government both routine and occasional activities (Dye, 1978). A course of action or procedure for solving social problems with a clear goal of what needs to be achieved (Anderson, 1975). The power to allocate all values in society is the government (Easton, 1971). Factors that determine the implementation of policies to achieve results require a good chain of command and the capacity for coordination and control (Pressman & Wildavsky, 1973).

#### *Theory Model of Public Policy Implementation*

##### *Van Meter and Van Horn Model*

The fundamental idea of this model cited the policy implementation process model

(Easton, 1971). The key components of the model include policy standards and objectives; policy resources, inter-organizational communication and enforcement activities, characteristics of lamenting agencies, economic, social, and political conditions, and the disposition of implementers (Van Meter & Van Horn, 1975).

##### *Paul Sabatier and Danial Mazmanian Model*

This model aims to study policy implementation through the rational model (Paul Sabatier & Daniel Mazmanian, 1980). The key components of the model include the capacity to solve the problems specified in the policy, the capacity to define the operational structure to achieve the specified policy results, and the overall impact of other variables on supporting the policy implementation to achieve the objectives.

##### *Lipsky Model*

The key components are that all members of the organization can exercise their discretion (Elmore, 1978), especially civil servants who have to closely handle the public or so-called “Street-Level Bureaucrats” who can exercise their discretion in performing their duties without their superiors' interference (Lipsky, 1980).

##### *Berman and Mclaughlin Model*

Macro Implementation, higher-level agencies must determine proper policies while lower-level agencies accept policies and determine policies within their units according to the accepted policies. Micro implementation starts with lower-level agencies accepting policies from higher-level agencies and then modifying the policies into operational guidelines based on changes in the work processes in each original agency (Berman, 1978).

##### *Collaborative Governance (CG)*

Collaboration refers to working together to achieve mutual goals by working across boundaries in multisector relationships based on reciprocity (O'Leary et al., 2006). Collaboration refers to a purposeful relationship to solve a problem by creating or discovering solutions under a set of constraints (Agranoff & McGuire, 2003). Collaborative governance refers to governance in which one or more public agencies work directly with private agencies in a formal, consensus-based, and deliberative decision-making process to implement public policies (Ansell & Gash, 2008). Collaborative governance refers to the process and structure of decision-making and public policy management, not limited to government agencies (Nabatchi, 2016). A form of management of cooperation between the public sectors (Krane & Wright, 2000).

## *Concepts and Theories on Service Quality*

### *Efficiency*

Efficient work is related to the application of scientific management methods to management, focusing on resource management and the importance of the organization's structure and goals (Emerson, 1931). Efficiency refers to the ability to deliver goods or services in the appropriate quantity and quality at the least cost, quality, quantity, time, and method (Peterson & Plawman, 1963). For a government agency, the satisfaction of the service recipients must be also considered (Simon, 1950). Efficiency refers to the ability to achieve the desired outcomes within a short time and the effort to achieve complete outcomes (Good, 1973). Efficiency refers to the ratio of output to the efficiency measurement factors (Gibson et al., 1991). Human efficiency refers to a positive relationship with effort in work. Work efficiency is considered from the perspective of individual work, compared to what is devoted to the work (Ryan & Smith, 1954).

### *Effectiveness*

Effectiveness refers to the goal achievement (Etzioni, 1964). Effectiveness refers to the group's capacity to work on its assigned tasks (Fiedler, 1967). Effectiveness refers to the achievement of organizational goals (Barnard, 1977). Effectiveness refers to the leader's ability to distinguish between management and resource utilization to achieve the specified objectives (Steers, 1977). Effectiveness refers to the ability to perform actions to achieve the specified goals (Lawless, 1979). Organizational effectiveness refers to the ability of the organization to utilize limited and valuable resources from the environment to support the organization's operations (Seashore & Yuchtman, 1991). Effectiveness refers to an action aimed to produce some result. The level of effectiveness of the action or effort depends on the outcome in both quantity and quality with little effort (Gibson et al., 1982).

### *Biometrics*

#### *DNA*

DNA fingerprints are base sequences that are unique to each person and can confirm the identity of the individual. This method can be used to detect suspects who have committed crimes by collecting DNA samples from the crime scene and comparing them with the suspect's DNA (ENFSI, 2015). This helps in bringing the criminals to justice, proving the guilt of the defendant, and protecting the innocent. The DNA database of the United States is considered the largest database in the world (Wallace, 2006). DNA databases are useful for the justice process (Lazer & Meyer, 2004).

#### *Fingerprints*

Fingerprints at the crime scene are key evidence to identify the criminal (Kaushal & Kaushal, 2011). Collecting samples of suspects' fingerprints to compare with latent fingerprints from the crime scene, or collecting latent fingerprints from the crime scene to compare with the criminal record database in the computer system can verify the identity of the criminal (National Geographic, 2018).

#### *Dental Analysis*

Teeth are part of the human body with unique structures and characteristics. Sometimes, they can identify an individual (Kaur et al., 2013). Since teeth are inside the mouth, they are strong enough to withstand external forces. Even if the body decays, the teeth can remain in shape for a long time. Therefore, they can effectively identify an individual (Hinchliffe, 2011).

## Methodology

This research relied on **qualitative** research method. Qualitative research method was employed by using in-dept interviews with 15 key informants and a focus group discussion with 12 key informants to confirm.

### *Qualitative Research*

This was qualitative research with field research. Data collection was carried out on the field. There are 4 steps as follows:

Step 1: Case studies were selected through purposive sampling. The area, population, and sample size were determined for qualitative data collection.

The criteria were determined for selecting the areas as case studies, including the Metropolitan Police Bureau and the Provincial Police Regions 1-9), totaling 10 areas. A simple random sampling was employed.

The key informants were selected with in-depth interviews using purposive sampling, which is considered from the researcher's own decision. The selected sample group must follow the research objectives with knowledge, expertise, and experience in that matter. Inclusion criteria for the key informant are as follows:

Police officers, practitioner level, must be stationed at police stations. The selection was performed by sending letters to the police station to select police officers under supervision with qualifications and relation to the use of biometrics for crime control. The interviewees must be willing and their identities must be kept confidential so that the content of the interview does not affect the interviewees.

People who use the service and are victims of crime, people's representatives in private development organizations, or lawyers who have a role in helping victims on a voluntary basis

The executive police officers in charge of policy are selected from senior police officers who are involved in the control and supervision of policies related to the use of biometrics in law enforcement.

Scientists and experts in forensic science on a voluntary basis

The number of participants was 15 or until the data reached saturation.

Step 2: A research instrument was developed. The interview form must be complete and accurate for complete, accurate, and in-depth data. The researcher is considered a key instrument for the research. The conceptual framework and objectives of the research must be reviewed before developing the interview form. The research project advisor examined the accuracy of the content and language used in the interview form. Then, the interview form was revised and improved according to the advice to ensure completeness and suitability for interviews.

Step 3: Data collection: The researcher went to the field to interview the samples using in-depth interviews. Individual interviews were conducted to obtain complete and in-depth data. For the interviews with police officers, practitioner level, stationed at the police station, the people who use the service must be involved in the use of biometrics, policy executive police officers, scientists, forensic experts, and case studies.

Step 4: Data Analysis: The data obtained were reviewed, examined by triangulation, compared, analyzed, and processed to link relationships in various aspects based on rational facts, and the data were presented as a research report.

*A Focus Group Discussion*

Participants were allowed to interact and discuss issues. Widely discussed and exchanged opinions on various issues to answer the research questions with 12 key informants, which were different from in-depth interviews. After a focus group discussion, we have created a model as a guideline for police stations.

Table Showing Research Methodology

Table 1. Research Methodology Based on Objectives

Data from a Researcher

Focus of Analysis	The Objective of the Research	Research Process	Data Collection	Data Analysis Method	Data Source
1. Exploratory Stage	To study the situation, analyze problems in law enforcement using biometrics for crime control To present the policy law enforcement model of the royal Thai police as a guideline for police stations	Qualitative Research	1. Document	1. Content Analysis 2. Analytic Induction	1. The public 2. Police 3. Experts
2. Model generalization			2. In-depth-Interview 3. Focus group		

Table 1. Research Methodology, Law Enforcement Using Biometrics for Crime Control

Source: Author's survey in 2023

## Results

### *Research Findings of Qualitative Research*

Topic 1: Situation and problems in law enforcement using biometrics for crime control

Biometrics and benefits

According to research, biometrics refers to the biological data of an individual representing the identity, such as facial features, eyes, DNA, fingerprints, blood type, etc. It can be seen that the use of a person's biometrics for crime control can be divided into 2 types:

Biometrics related to physical characteristics, such as fingerprints, hand geometry, voice, retina, facial biometrics, blood type, or DNA, etc.

Biometrics related to an individual's behavior, such as handwriting analysis, cards or information cards, etc.

Biometrics for law enforcement purposes and methods

According to research, biometrics can be used to benefit law enforcement to verify the identity of the person who committed the crime, prevent the misarrest, and surveillance dangerous people entering the area.

Law enforcement using biometrics for crime control as a process to enhance efficiency and respond to public needs

According to research, law enforcement using biometrics for crime control is a process that improves work processes to be efficient and responds to the needs of the people since the process is fast and accurate. The information can be retrieved immediately with an exchange of information to prevent crimes and reduce the opportunity for criminals to commit crimes.

#### *Related Agencies*

According to research, related agencies included the Office of Police Forensic Science, Institute of Forensic Medicine, Criminal Records Division, and Forensic Science Institute (Ministry of Justice).

#### *Policy Formulation*

According to research, the Royal Thai Police has already formulated the policy (Hill, 2005). At present, policy formulation is on hold. It relies on voluntary consent to collect data. The law giving authority is not present to store and collect data for the benefit of the country.

Problems in law enforcement, suggestions and solutions

According to research, there is a lack of supporting laws, clear responsibilities, personnel, budget, materials and equipment, integration, linkage, and the exchange of information between agencies.

Topic 2: Factors Affecting Biometrics Using for Crime Control

According to research, factors affecting the success of law enforcement by police officers who were at the level of policy executives included policy standards and objectives, policy resources, executive leadership and tangibility in policy. Factors affecting the success of law enforcement by police officers included practitioners' attitudes, problem-solving capability, situation awareness and policy implementation. Factors affecting the success by resources and tools included communication, support, organization structure and the disposition of implementer.

**Table 2. Superordinate And Subordinate Theme**

Category 1: Internal Factors

Superordinate theme	Subordinate theme
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1.1 <b>Police officers</b> who were at <b>the level of policy executives</b>	1.1.1 Policy standards and objectives 1.1.2 Policy resources 1.1.3 Executive leadership 1.1.4 Tangibility in policy
1.2 <b>Police officers</b>	1.2.1 Practitioner attitude 1.2.2 Problem-solving capability 1.2.3 Situation awareness 1.2.4 Policy implementation
1.3 Resources & Tools	1.3.1 Communication 1.3.2 Support 1.3.3 Organization structure 1.3.4 The disposition of implementer

Source: Author's survey in 2023

**Table 3. Superordinate and Subordinate Theme**

Category 2: External Factors

Superordinate theme	Subordinate theme
2.1 Supporting external environment	2.1.1 Economic condition 2.1.2 Social condition 2.1.3 Political condition
2.2 External support	2.2.1 Transparency, fairness, and audibility 2.2.2 Responsiveness to needs 2.2.3 Confidence in policy

Source: Author's survey in 2023

### *A Focus Group Discussion*

Biometrics are person's biological informations. They can be used to control crime, to prove a person's innocence, prevention of wrongful arrest, to identify the offender quickly, to prevent crime, to watch out for dangerous people and prevent dangerous people from entering the area. Problems and obstacles are 1) lack of budget, materials, personnel, 2) lack of experience and expertise in performing their duties, 3) no exchange of information between departments, and 4) lack of laws giving officials the power to collect the data.

### *Suggestions On Law Enforcement*

#### *Guidelines for Law Enforcement Development*

To drive law enforcement for officers to have the authority to collect such data, cooperation between agencies is required to link and exchange data with each other, including allocating a budget to purchase modern equipment. Personnel must be transparent, honest, fair, and efficient, and information must be provided to the public to understand the advantages of the law enforcement to prevent crime.

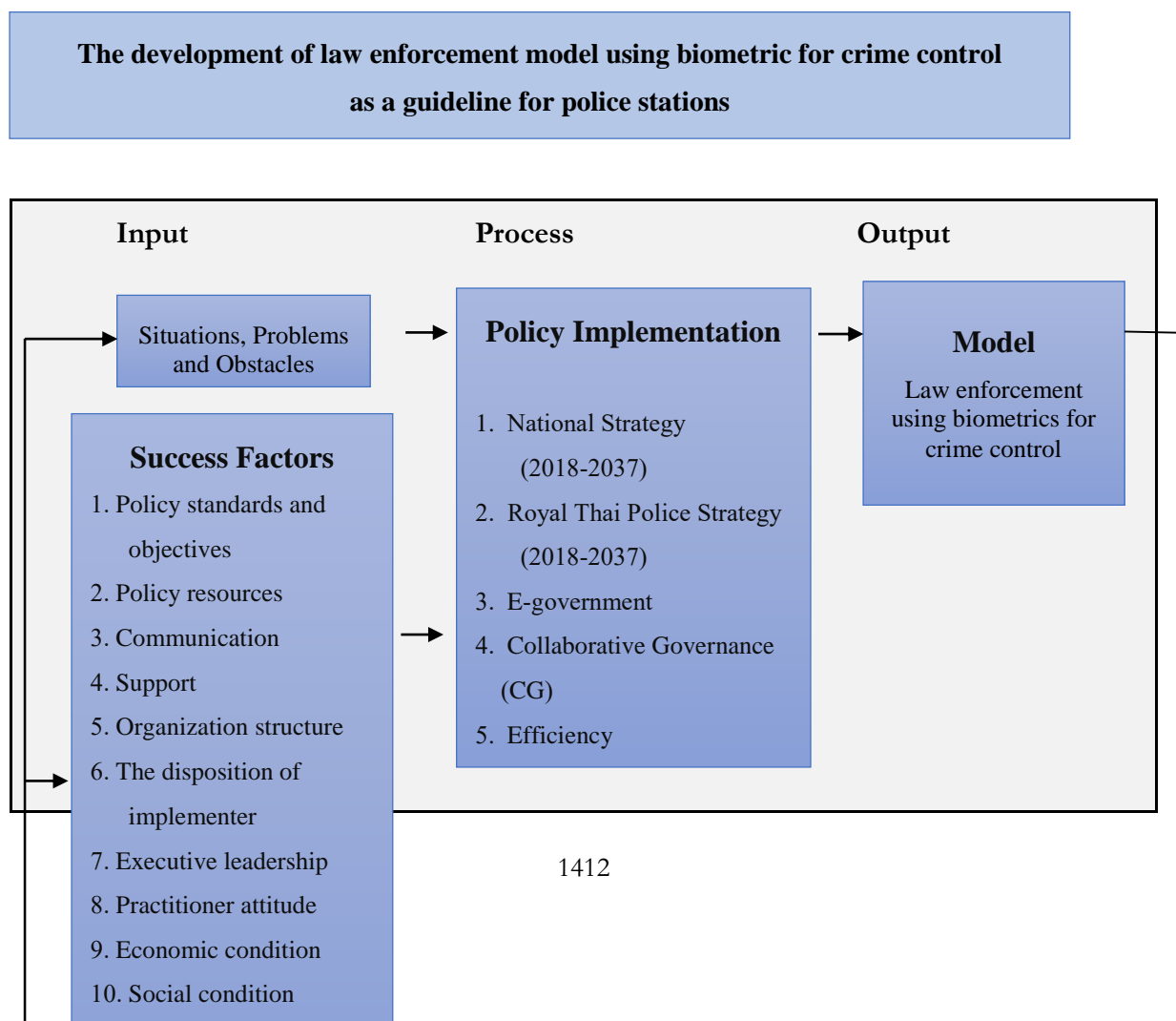


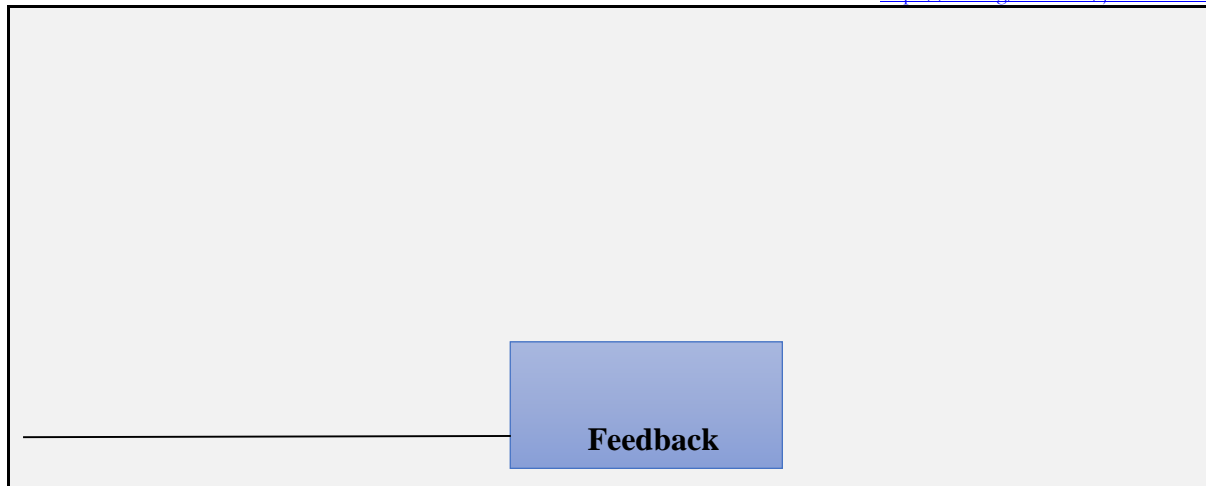
## Discussion

Biometrics refers to the biological data of an individual, representing the identity of each individual. Biometric data can be divided into 2 types: 1. biometrics related to physical characteristics, such as fingerprints, hand geometry, voice, retina, facial biometrics, blood type, or DNA, etc., and 2. biometrics related to the behavior of an individual, such as handwriting analysis, cards or data cards, etc. (Kizza, 2010). The European Union and the United States have laws on national DNA databases, granting authority to the government to store DNA data in the system, which are useful for the justice process (Lazer & Meyer, 2004). The national DNA database is a mechanism to help solve cases, bring criminals to justice, and protect the innocent in cases. Law enforcement using biometrics for crime control is a process that improves the efficiency of the work process and responds to the needs of the public. For guidelines for law enforcement development using biometrics, 1) policies are driven to be enacted as law enforcement with supporting laws that give officers the authority to store various data. 2) Databases are developed, including the storage of data in the form of Big Data, including supervision and control to prevent misuse. 3) Personnel are trained to have knowledge, skills, and expertise in their work. 4) Personnel must be honest, transparent, and fair. 5) A budget is allocated to purchase equipment that is efficient, modern, and sufficient for the task. 6) Each agency integrates, links, and exchanges data between agencies to enhance the efficiency of government work. 7) A data storage system is developed with the same standard for ease of use, integration, linking, and exchanging data. 8) The law and the officers are studied to develop a policy implementation model that is appropriate for the context of Thailand.

Therefore, it was found that “responsiveness to needs” had the highest influence on the effectiveness and efficiency of law enforcement using biometrics for crime control. If the Royal Thai Police Office has the objective to develop the implementation of such law enforcement policies, they should prioritize the issue of responsiveness to needs.

Based on research, a model for law enforcement using biometric for crime control is as follows:





**Figure 4. Law Enforcement Model**

Source: Author's compilation

Note: Figure 4 shows a law enforcement using biometrics model

## Summary

Biometrics refers to the biological data of an individual, representing the identity of each individual, such as facial features, eyes, DNA, fingerprints, blood type, etc. Biometrics of individuals is used in law enforcement, identification of individuals in criminal offenses, mis arrest prevention, surveillance on dangerous individuals entering the area, and providing justice to the people. It enhances the work process to be efficient and respond to the needs of the people. The Royal Thai Police has already formulated a policy, depending on voluntary consent for data collection. The law giving authority is not present, so there should be a law to support officers to have the authority for data collection. Problems include the absence of supporting law, clear responsibilities, a lack of personnel, budget, materials and equipment, integration, linkage, and exchange of data between agencies.

## Declaration of Competing Interest

There is no conflict of interest.

## Data Availability Statement

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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