

Strengthening Forensic Laboratory Methods in Solving Murder Case Without Witnesses: Case Study Polrestabes Bandung Jurisdiction

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Abstract

This study examines strengthening Scientific Crime Investigation (SCI) approaches through forensic laboratory methods for solving witness-less murder cases in Polrestabes (Metropolitan Police Resort) Bandung's jurisdiction. The case study focuses on Police Report LP/B/421/XII/2024/JBR/Restabes BDG/Sektor Batununggal, involving victim MMY who died from neck slashing and back stabbing by an unknown perpetrator. Forensic laboratory methods serve as central pillars of SCI approaches. Without eyewitness testimony, scientific analysis of physical evidence becomes the sole objective means of uncovering facts. Forensic laboratories enable precise analysis of DNA, fingerprints, blood, fibers, and digital traces which potentially identifying suspects or supporting alibis. These laboratories accelerate investigations while enhancing legal evidence validity through scientifically accountable methods. Strengthening forensic laboratory facilities, human resources, and operational systems is crucial for effective law enforcement in witness-less homicide cases. The study employs a qualitative case study approach based on the Polrestabes Bandung case. Data collection includes literature reviews, interviews with investigators and experts, and investigation document analysis. This analysis aims to provide recommendations for strengthening forensic laboratory method utilization in witness-less homicide investigations. The research expects to deliver concrete recommendations for enhancing forensic laboratory method implementation in similar cases, providing replicable insights for police investigators. Additionally, it aims to contribute to strategic policy development regarding forensic laboratory methods within law enforcement institutions, ultimately improving the effectiveness of criminal investigations when traditional witness testimony is unavailable.

Keywords: Criminal Investigation, Evidence Analysis, Forensic Laboratory, Scientific Crime Investigation, Witness-less Murder Cases.

1. Introduction

Crime is a social phenomenon that commonly appears in people's lives. In Indonesia, crime continues to increase over time. Some criminal acts and deviant behavior are influenced by socio-cultural conditions in the community (Runturambi, 2018). Murder is one type of crime that often occurs. Murder is regarded as a grave offense that significantly affects not only the victim and their family but also society as a whole. During an investigation, having witnesses present often plays a critical role in uncovering what took place. Nevertheless, there are numerous instances where the crime happens in isolated areas or without any eyewitnesses, complicating the collection of legal evidence. This situation compels law enforcement to depend on scientifically-based investigation techniques, known as Scientific Crime Investigation, to objectively uncover the truth.



As a law enforcement body, the Indonesian National Police serves a vital role as outlined in Article 13 of Law No. 2 of 2002 regarding the Indonesian National Police. Their duties include upholding public safety and order, enforcing laws, and offering protection, guidance, and services to the community. In the realm of murder investigations, the effectiveness of the methods utilized by the Indonesian National Police can greatly influence their ability to enforce the law. Traditional investigative approaches, like questioning suspects and interviewing witnesses, face limitations since they rely on the truthfulness, recall, and personal viewpoints of individuals, who can be easily swayed, psychologically pressured, or inaccurate in their memories (Sukmayoga Wiweka et al., 2024). This method proves to be less effective due to the absence of direct information that could support the investigation.

Regarding the revelation of homicide cases without eyewitnesses, the method of Scientific Crime Investigation is crucial, especially considering the limited verbal information that can be gathered from witnesses. In such cases, the absence of eyewitness testimony in homicide incidents forces police to turn more towards scientific methods that include a range of forensic fields, including DNA testing, fingerprint analysis, ballistics, toxicology, and digital forensics. By combining scientific methods with sophisticated investigative tactics, the investigation becomes more systematic, accelerates the resolution of cases, and improves the dependability of evidence used in court.

Mukarom & Setyabudi (2023) describe Scientific Crime Investigation as a method of examining crimes that combines scientific techniques, technology, and thorough examination of forensic data. This strategy is becoming increasingly essential for discovering facts in an unbiased manner, particularly through the study of physical evidence and the application of advanced forensic technologies. The significance of this method is acknowledged in the Regulation of the Chief of Police No. 6 of 2019, specifically in Chapter V Article 34, which indicates that investigators may utilize technical assistance to enhance the scientific evidence in criminal inquiries. Moreover, Article 35 elaborates on the details of this technical support.

Forensic laboratories play a vital role in uncovering unwitnessed murders, especially in cases such as the murder of a victim with the initials MMY that occurred in the Polrestabas (Metropolitan Police Resort) Bandung area. Without any eyewitnesses who can provide direct information, physical evidence produced from laboratory examinations becomes the main source in the investigation process. Forensic laboratories as stated in the Chief of Police Regulation No. 6 of 2019, provide much-needed technical assistance to test evidence that requires special handling, such as DNA samples, fingerprints, or ballistic analysis results. In the MMY murder case, the forensic laboratory played a role in providing scientific evidence that could reconstruct the incident and help investigators identify the perpetrator, strengthen the theory of murder, and strengthen evidence that could be used in court. With a reliable forensic laboratory, investigations become more systematic and objective so that the legal process can run more effectively even without eyewitnesses.

In the process of proving a crime, as stated in Article 184 Paragraph 1 of the Criminal Code regarding valid evidence can be in the form of expert testimony, defendant's testimony, letters, witness testimony, and clues. Furthermore, Article 184 Paragraph 2 also states that valid evidence in the criminal justice process can also be something that is commonly known or does not have to be proven in the form of clues (for example CCTV footage, forensic evidence and laboratory test results) and expert testimony (such as forensic experts, ballistics experts, or forensic IT experts). All of the evidence mentioned above has an equally strong position and can stand alone or support each other depending on the context of the case. The Criminal Code does not regulate the order of priority between these pieces of evidence so the strength of the evidence depends more on the quality, relevance and relevance to the case being investigated.

In cases such as murder without witnesses, evidence such as clues and expert testimony such as forensic experts can be more dominant.

One of the applications of the Scientific Crime Investigation approach through the forensic laboratory method was implemented by the Bandung Police Investigators. This approach began to be implemented on the grounds that murder is one of the most serious crimes in the Bandung Police, and the murder rate has shown a fluctuating trend in recent years, so further analysis is needed to determine the role of the Scientific Crime Investigation approach to assist in revealing murder cases, especially in cases without witnesses.

The use of the Scientific Crime Investigation method through the forensic lab technique by the Bandung Police Investigators has actually been implemented according to the guidelines set forth in Police Chief Regulation Number 6 of 2019 regarding Criminal Investigations. This framework served as the foundation for uncovering the murder of a victim identified by the initials MMY, as stated in Police Report Number 421/XII/2024/JBR/Restabes BDG/Sektor Batununggal, dated December 4, 2024. The body of the victim, MMY, was discovered lying face down, with wounds present on both the neck and the back. The crime was committed by an unidentified offender, and very few or no witnesses were available, highlighting the importance of the Scientific Crime Investigation method using forensic analysis in solving the homicide of victim MMY for ongoing inquiries.

Forensic laboratory techniques play a crucial role in murder cases that occur in the absence of witnesses related to the victim MMY. Such situations often make the investigation more challenging due to the lack of direct evidence that could serve as an initial lead. In the absence of eyewitnesses, detectives must depend entirely on physical evidence and forensic evaluations to piece together what happened and identify the suspect. Given the context of this issue, the author has decided to explore the research topic strengthening forensic laboratory methods in solving murder case without witnesses. The purpose of this study is to understand and assess how forensic laboratory techniques are applied in revealing murder offenses that lack eyewitnesses. Additionally, this research aims to identify and analyze the factors that affect the use of forensic laboratory methods, including both supportive and obstructive elements, in uncovering murder cases without witnesses. The goal is to develop a strategy to improve forensic laboratory methods so they can be effectively utilized in resolving witness-less murder cases in the future.

2. Literature Review

Murder refers to the act, process, or approach of taking someone's life (to destroy, terminate, or remove life). It happens when an individual deliberately causes the death of another person, and to do this, the offender must perform a sequence of actions that result in that person's demise (Yeyen, 2021). Murder is classified as a criminal offense, commonly referred to as the crime of murder. This type of crime is viewed as an offense against human life as outlined in the Criminal Code (KUHP). The severity of this offense leads to significant legal repercussions, as it involves the illegal deprivation of an individual's life.

Murder cases represent one category of intricate legal matters and can often be challenging to prove due to the lack of witnesses. In fact, in the judicial system, evidence is crucial for ensuring justice is properly administered. The primary aim of evidence in the legal field is to assist in ascertaining the guilt or innocence of the defendant (Dee, 2024). As a result, a variety of approaches are currently implemented, including a shift from traditional evidence methods to more advanced technological practices.

Scientific Crime Investigation (SCI) is a method for criminal inquiries that employs science and technology to gather, analyze, and evaluate evidence in a scientific manner. SCI incorporates different forensic fields, such as forensic identification, forensic laboratories, forensic psychology, forensic medicine, and digital forensics (Marjuki & Panjaitan, 2024). This approach is gaining traction for use in proving cases, including those of murder. One of the strategies employed is the forensic laboratory method.

It is widely recognized that, forensics is one of the most significant branches of science, not only in the medical world, but has also provided many benefits in criminology and law enforcement (Maramis, 2015). Forensic laboratories play an important role in the scientific investigation approach because they are able to provide objective and measurable evidence. Houck & Siegel (2015) emphasized that forensic laboratories are the center of scientific analysis carried out on evidence to ensure material truth in a criminal case. Through the use of strict scientific methods, forensic laboratories can identify types of substances, determine wound patterns, compare DNA or fingerprints, and trace digital traces, all with a high level of accuracy and can be accounted for in court. Therefore, this study is expected to help in creating a strategy to strengthen forensic laboratory methods so that they can be optimized for revealing murder cases without witnesses in the future.

2.1. Scientific Crime Investigation Approach

With advances in forensic technology, digital analysis, and various other scientific methods, law enforcement officers can now collect and analyze evidence more precisely and systematically. This technology not only increases efficiency in investigations but also allows for a more objective review of existing evidence, thereby reducing reliance on mere confessions (Marjuki & Panjaitan, 2024).

As one form of approach in criminal investigations, Scientific Crime Investigation plays a significant role. The Scientific Crime Investigation approach itself is a scientific-based investigation method that utilizes technology and forensic principles in uncovering crimes. This aims to ensure that the investigation process can be based on objective data and can also be legally accounted for. Scientific Crime Investigation plays an important role in identifying perpetrators of crimes, collecting legally valid evidence, and analyzing crime patterns for the purposes of investigation and evidence. This approach involves forensic analysis, digital technology, and other scientific methods to ensure that investigations are carried out objectively and based on valid evidence.

In the Chief of the Indonesian National Police Regulation Number 6 of 2019, Chapter V, Article 34, it is outlined that “Investigators conducting criminal inquiries are backed by technical assistance aimed at gathering scientific evidence (Scientific Crime Investigation). Additionally, Article 35 in the same regulation clarifies the forms of technical support mentioned in Article 34, one of which is the employment of a forensic laboratory. This laboratory is essential for investigators addressing issues that necessitate the examination or analysis of evidence requiring specialized handling and/or procedures.

Moreover, when employing the Scientific Crime Investigation method, the analytical framework utilized by investigators incorporates the Triangle Crime Scene concept, commonly called the Evidence Triangle. This Evidence Triangle Theory describes the connection between three key components involved in a crime: the victim, the offender, and the instruments used to commit the act (Rahtinuka, 2014). The triangle evidence is created by the interrelated nature of these elements: the victim, the felon, and the tools (each representing a point of the triangle) that interact during the crime (Tamza & Shafira, 2023). The process of substantiation is characterized as the scenario in which evidence either exists or can be derived from other evidence. Consequently, the coherence and precision of the evidence collected, organized, and

evaluated by investigators greatly impact the validity of the proof process in court (Sumali et al., 2022).

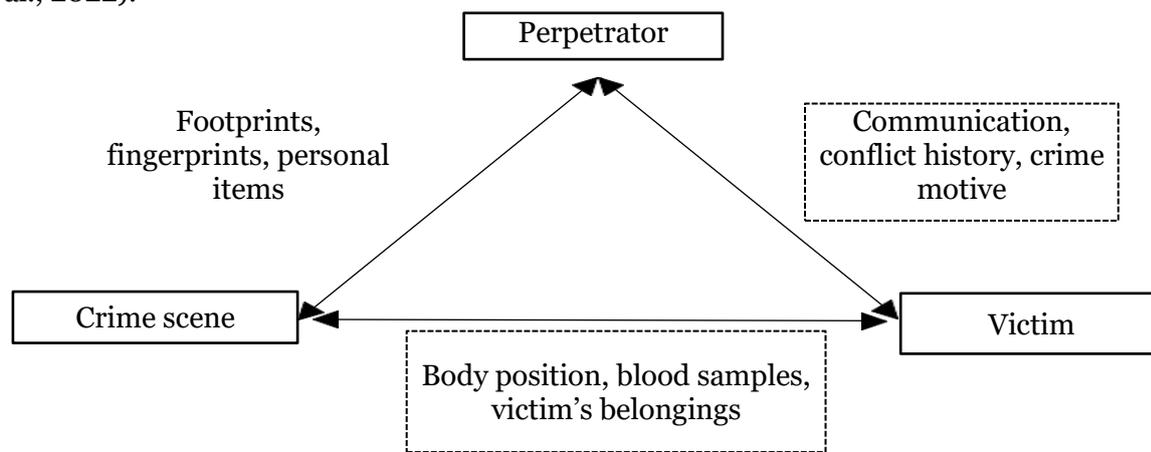


Figure 1. Triangle Crime Scene
Source: Author

In situations involving murder without witnesses, the Triangle Crime Scene analysis framework, also known as the Triangle of Evidence, gains importance because it facilitates the reconstruction of happenings through scientific data, thereby enhancing the use of Scientific Crime Investigation to uncover facts in an unbiased and precise manner. While having witnesses is beneficial, their absence does not imply that the case is unsolvable. Forensic science enables the examination and recreation of events with the evidence that is obtainable, particularly utilizing the Triangle of Evidence method. The aim is to uncover physical traces that can be examined to pinpoint the offender responsible for the crime. This trace evidence may include blood, DNA, fingerprints, shoe prints, hair strands, and other types of minute evidence. Investigators at crime scenes employ various methods and tools to gather and safeguard this evidence, such as cameras, fingerprint readers, swabs, and evidence collection bags (McKee, 2023). At the very least, the Triangle of Evidence Approach will require the analysis of:

- a. Victim: Examines cause of death, injuries, and potential clues.
- b. Perpetrator: Looks for fingerprints, DNA, or other evidence that could point to the perpetrator.
- c. Evidence at the crime scene: Analyzes locked doors, room layouts, and other objects that could shed light on the crime.

By carefully analyzing these three elements, investigators can piece together the events, even without the aid of eyewitness testimony.

2.2. Forensic Laboratory Methods

Forensics is one of the most significant branches of science, not only in the medical world, but has also provided many benefits in criminology and law enforcement. The term forensics, which comes from the Latin “*forensis*” meaning “from outside” and is related to “forum” meaning “open place”, is a discipline used to support the justice process through the application of science. The word forensics is also often equated with forensic science (Maramis, 2015). Forensic science is one of the branches that applies clinical medical science. This science is always related to law, especially in the aspect of law enforcement (Khairunnisa, 2014).

Meanwhile, the Forensic Laboratory or often abbreviated as *Labfor*, is a technical facility owned by the Indonesian National Police which functions to carry out scientific examinations of evidence found in a crime. This examination is carried out by forensic experts with specific expertise according to their fields, such as ballistics, forensic biology, forensic chemistry, toxicology, and digital forensics. The main function of the forensic laboratory is to assist the investigation process scientifically and objectively, so that the results can be used as valid and strong evidence in the criminal justice process.

Forensic laboratories play an important role in the scientific investigation approach because they are able to provide objective and measurable evidence. Houck & Siegel (2015) emphasize that forensic laboratories are the center of scientific analysis conducted on evidence to ensure material truth in a criminal case. Through the use of strict scientific methods, forensic laboratories can identify types of substances, determine wound patterns, compare DNA or fingerprints, and trace digital traces, all with a high level of accuracy and can be accounted for in court.

In addition, as noted by Houck & Siegel (2015), forensic laboratory activities are not only technical but also play an integral part of the criminal justice system because the results can directly influence legal decisions. Therefore, strengthening laboratory facilities, increasing expert competence, and standardizing procedures are very important to ensure that the law enforcement process remains based on the principles of justice and scientific truth.

Some of the main types of examinations conducted in a forensic laboratory include:

- a. Forensic Biology Examination: Includes analysis of DNA, blood, semen, hair, and other body tissues that can help identify the victim or perpetrator.
- b. Ballistic Examination: Analyzes projectiles, firearms, and bullet casings to determine the type of weapon and the direction of the shot.
- c. Forensic Chemistry Examination: Examines dangerous chemicals, poisons, explosives, or suspicious liquids.
- d. Fingerprint and Footprint Examination: Matches fingerprints or palm prints found at the crime scene with suspect data.
- e. Digital Forensic Examination: Involves analysis of electronic devices such as cellphones, laptops, or CCTV to trace the perpetrator's digital footprint.

2.3. Previous Research

To strengthen the foundation of this research, reference is made to a study by Mukarom & Setyabudi (2023) which examines human resource development for investigators within the context of crime scientific investigation at the Directorate of General Criminal Investigation, Polda Metro Jaya, using a case study approach. This study reveals that recognizing the need to improve human resources for investigators in the field of CSI, such as training, additional knowledge, and technical skills is one of the explorations of human resource development for CSI-based investigators. With the right human resource strengthening, Directorate of General Criminal Investigation Polda Metro Jaya can improve the effectiveness and efficiency in investigating criminal cases, including handling the death of a family in Kalideres.

In another study by Maghantara (2023), it was revealed that the mechanism for disclosing the premeditated murder case against Maroah which was applied with the SCI approach by the Directorate of Criminal Investigation of the Metro Jaya Police was carried out through investigation and inquiry. This SCI approach has proven effective in the investigation and law enforcement process in the case. The suggestion made is for investigators and the Identification Unit to take vocational education, training, and workshops.

Sativa (2021) also revealed something similar, where the Scientific Investigation method applied by the Barelang Police Criminal Investigation Unit has contributed effectively to

revealing murder cases, although there were also supporting and inhibiting factors. Amalia (2007) also revealed that Scientific Investigation on Evidence is very useful for law enforcement in uncovering crimes. This process can explain the meaning of the existence of silent witnesses or evidence found.

3. Methods

3.1. Types of research

This type of research is classified as qualitative research, which aims to comprehend the meanings that individuals or groups assign to specific social phenomena or human issues (Creswell, 2014). Qualitative research allows the researcher to engage directly in the field to observe unfolding events, with the intent to illustrate certain characteristics that arise during the relevant study (Austriani et al., 2016).

Furthermore, the author opted for descriptive analysis as a method because it effectively describes a phenomenon in detail and analyzes it to identify patterns, relationships, or deeper implications. Through this research approach, the author aims to portray how forensic laboratory methods are applied in solving a murder case without witnesses, specifically in the case study LP/ B/ 421/ XII/ 2024/ JBR/ RESTABES BDG/ SEKTOR BATUNUNGGAL under the jurisdiction of Polrestabes Bandung, and subsequently analyze ways to strengthen forensic laboratory methods at Polrestabes Bandung.

3.2. Data Collection Techniques

Data collection is defined as the process to obtain data (Sugiyono, 2017). For this research, the data collection methods employed include interviews and documentation. Interviews involve obtaining information by directly questioning a source through in-person discussion (Afifuddin & Saebani, 2012). Data collection through interviews is carried out by submitting questions verbally to the source which in this case, officials who are members of the Bandung Police Criminal Investigation Unit and experts from *Apsifor* (Forensic Professional Association) and *Labfor* (Forensic Laboratory) related to the case study being studied. The sources in this study were selected based on their positions and expertise that were relevant to the research topic. The researcher will conduct interviews with the Head of the Bandung Police Criminal Investigation Unit, the Head of Criminal Investigation Unit and Violence of Bandung Police, Officers and Members of the Bandung Police Criminal and Violence Unit. The author conducted interviews using interview guidelines in asking questions that were in accordance with the research objectives.

Data collection techniques through documentation basically refer to the use of documents as a source of information or data. According to Sugiyono (2017), documentation is a technique for obtaining data from written documents, images, or monumental works that can provide information or supporting evidence for the object being studied. In the context of this study, documentation techniques are used to obtain supporting evidence related to the application of forensic laboratory methods in disclosing the crime of murder in the case study of LP/B/421/XII/2024/JBR/RESTABESBDG/BATUNUNGGALSEKTOR. Several documents studied include crime scene processing reports, forensic documents, photos of victims and the scene of the incident, to archives of inter-unit communication within the Bandung Police.

3.3. Data Analysis Techniques

In this research, the method for analyzing data is qualitative, meaning it focuses on interpreting the significance of facts, incidents, and activities occurring in the area of study. The analysis is conducted in an inductive manner which involves developing comprehension

based on what is discovered in the field rather than relying on pre-established hypotheses. This method allows the author to grasp the evolving dynamics and meanings that arise from the data, thus ensuring that the analysis results accurately portray the actual circumstances present in the field. As stated by Creswell (2014), the stages involved in the data analysis process comprise several key actions, including data reduction, coding, categorizing themes, presenting data, formulating provisional conclusions, validation, and arriving at definitive conclusions.

4. Results and Discussion

4.1. Research Results

4.1.1. Chronology of the case

LP/B/421/XII/2024/JBR/RESTABESBDG/BATUNUNGGAL SECTOR

In this research, the method for analyzing data is qualitative, meaning it focuses on interpreting the significance of facts, incidents, and activities occurring in the area of study. The analysis is conducted in an inductive manner (Creswell, 2014), which involves developing comprehension based on what is discovered in the field rather than relying on pre-established hypotheses. This method allows the author to grasp the evolving dynamics and meanings that arise from the data, thus ensuring that the analysis results accurately portray the actual circumstances present in the field. As stated by Creswell (2014), the stages involved in the data analysis process comprise several key actions, including data reduction, coding, categorizing themes, presenting data, formulating provisional conclusions, validation, and arriving at definitive conclusions.

Through fingerprint and DNA analysis, the victim's identity can be identified. The results of the crime scene investigation and CDR data analysis show that the victim had communication with the perpetrator in Bandung. The Polrestabes team then conducted an investigation related to the perpetrator's identity and found that the perpetrator was a commercial sex worker (pimp) at a hotel in the city of Bandung.

After conducting further investigation, the Polrestabes team found the perpetrator's whereabouts in Bandung Regency. The Polrestabes team then arrested the perpetrator and conducted an investigation. The perpetrator admitted his actions, which were motivated by resentment because the victim did not fulfill his promise to sell drugs. They promised to make a COD (Cash on Delivery) transaction for the goods of drugs, but the victim replaced them with coffee powder.

The perpetrator's statement was in accordance with the results of the crime scene investigation and the evidence found. The Polrestabes team then conducted further investigation of the perpetrator and found that the perpetrator had a partner who was also involved in the case. The perpetrator and his partner were then charged with murder and threatened with life imprisonment.

4.1.2. Application of Forensic Laboratory Methods in Case Disclosure: Types of Forensic Laboratory Examination Conducted

In this case study, the examinations conducted by *Labfor* include forensic biology analysis for DNA evidence and latent fingerprint analysis for physical identification. The specifics of each examination are outlined below:

- 1) Forensic Biology/Forensic DNA Examination

The purpose of this examination is to establish an individual's identity by analyzing biological materials such as sweat, skin cells, or saliva found on plastic surfaces. The steps for DNA or forensic biology examination include the following:

- a. Evidence Collection: The plastic item is carefully repackaged following sterile protocols and placed in the biological analysis room.
 - b. Biological Trace Investigation: The examiner searches for stains or possible areas using UV or ALS (Alternative Light Source) illumination.
 - c. DNA Sampling: The sampling process involves using sterile cotton swabs to collect samples from identified areas.
 - d. DNA Extraction: Specialized chemicals are utilized to extract human cells and isolate DNA from the nucleus.
 - e. Amplification (PCR): The Polymerase Chain Reaction (PCR) technique is employed to amplify the DNA, creating a profile suitable for analysis.
 - f. Electrophoresis: The DNA profile is displayed in the form of a graph or line on a gel medium.
 - g. Comparison: The generated profile is compared against the DNA of the victim, suspect, or any existing database if available.
 - h. Findings and Interpretation: A report is generated outlining the match, the possibility of contamination, and the level of statistical certainty.
- 2) Fingerprint/Dactyloscopy Examination

This examination aims to identify the perpetrator through fingerprints left on the surface of the evidence. The details of the fingerprint examination are as follows:

- a. Receipt and Securing of Evidence: The plastic package is submitted to the Dactyloscopy Unit in a sterile and sealed condition.
- b. Initial Visual Examination: Observations are made with ordinary light and low-angle lighting to detect the possibility of latent fingerprints (not visible to the eye).
- c. Fingerprint Fixation: For non-porous plastic surfaces, black, white, or magnetic fingerprint powder is used, or superglue fuming (cyanoacrylate fuming) can also be used in a closed room to harden and highlight fingerprints.
- d. Documentation: The fingerprints that appear are documented through photography and the lifting process (transfer) to the dactyl card.
- e. Comparison: The fingerprint results are compared with the national fingerprint database (INAFIS) or with those of the suspect/victim.
- f. Results & Reports: A report is prepared summarizing the suitability and relevance to the case.

Evidence that can be sent to the Forensic Laboratory is physical evidence, such as DNA samples and fingerprints. This evidence is packaged and labeled, sent to the Sentul Forensic Laboratory Center, Bogor Regency, West Java, along with the BB-LAB form. The procedure for sending evidence carried out by Bandung Police investigators follows the Standard Operating Procedures (SOP) set by the National Police Headquarters as follows:

- a. DNA evidence and fingerprint samples are packaged safely and sterile, labeled, and a handover report is made.
- b. The forensic test request form or BB-LAB form is filled out by the investigator and attached with the DNA evidence and fingerprint samples.
- c. The evidence is sent directly by the investigator or appointed officer to the Sentul Forensic Laboratory Center, West Java.

- d. After the analysis is complete, the results of the evidence test are returned in the form of an official report that can be used as evidence in the case file.

In general, it can be said that the results of Forensic Laboratory analysis can greatly influence the direction of the investigation of unwitnessed murder cases, especially to convince investigators when there is minimal evidence in a case so that it can clarify the suspicions directed at the perpetrator. The results of the analysis carried out by the Forensic Laboratory (*Labfor*) can greatly influence the course of the investigation in unwitnessed murder cases in the following ways:

- a. Determining suspects: *Labfor* analysis can provide assistance in finding suspects by comparing evidence found at the scene with information stored in the database.
- b. Proof of relationship: The results of the analysis from *Labfor* can confirm the relationship between the suspect and the victim, such as the presence of DNA traces or fingerprints of the suspect at the scene.
- c. Guidance of the investigation: The results of the *Labfor* analysis can provide direction to investigators to focus on more specific matters, for example by examining the suspect's alibi or looking for other evidence related to the suspect.
- d. Increased trust: The results of the *Labfor* analysis can increase investigators' confidence in the accusations directed at the perpetrator, thereby helping them make more appropriate decisions during the investigation process.

As such, the findings from *Labfor's* analysis are extremely beneficial for detectives dealing with homicide cases lacking witnesses, particularly when there is scant evidence available. These findings assist investigators in constructing a more robust case and enhance the likelihood of apprehending those responsible for the crime. In situations where murders occur without any witnesses, *Labfor's* analysis can be viewed as a vital component in unraveling the case, as it aids investigators in recognizing potential suspects and substantiating their culpability. Consequently, *Labfor's* contribution is essential in the investigative process concerning homicide cases with no witnesses.

4.1.3. Supporting and Inhibiting Factors

Challenges or obstacles frequently encountered in using *Labfor* results include:

- a. Time: The duration from making an analysis request to getting the analysis results can hinder progress. This delay might slow down the investigative process and reduce its effectiveness. Investigators have to wait for the results, which can be time-consuming, affecting their capacity to swiftly apprehend the criminals involved.
- b. Coordination: Effective collaboration between investigators and the *Labfor* team often proves difficult, particularly when communication relies on letters or indirect methods. Such circumstances can lead to challenges in getting timely updates on the status of the analysis, thereby affecting the investigation. It is crucial for investigators to have quicker and more precise access to information regarding the analysis outcomes. Strong communication between investigators and the *Labfor* team is essential to ensure that the analysis findings are utilized efficiently in the investigative process. Investigators require quicker and clearer access to information about the results and should be able to reach out to the *Labfor* team for further clarification or additional details.

Meanwhile, the most supportive factor for maximizing *Labfor* results in revealing a case is time efficiency. This allows investigators to receive reports on the results of evidence analysis quickly. In this way, investigators can immediately find out the results of the analysis

and continue developing the case. Time efficiency in sending *Labfor* analysis results plays an important role because it can accelerate the investigation and disclosure of cases. With analysis results obtained quickly, investigators are able to make more precise and effective decisions during the investigation process. There are several advantages to the speed of time in sending *Labfor* analysis results, including:

- a. Investigators can immediately find out the results of the analysis and continue developing the case.
- b. The investigation process becomes faster and case disclosure can be carried out more efficiently.
- c. Investigators can make more accurate and efficient decisions in investigations.
- d. Public trust in law enforcement agencies can increase thanks to fast and effective case disclosure.

Therefore, the speed of time in sending *Labfor* analysis results is very important to support maximizing *Labfor* results in disclosing cases.

4.1.4. Strengthening Strategy

Suggestions for making the *Labfor* method more effective and efficient in cases with minimal witnesses in general can be done by socializing the Work Units in the relevant regions regarding updates to the analysis methods owned by *Labfor*. In other words, the suggestion that can be submitted so that the *Labfor* method becomes more effective and efficient in situations with few witnesses is to hold socialization activities to the Work Units in the relevant regions regarding updates to the analysis methods owned by *Labfor*. In this way, the Work Units in the regions can understand the strengths and limitations of *Labfor* in examining evidence found at the scene of the incident (TKP).

This socialization activity can increase the understanding and knowledge of the Work Units in the regions regarding the various analysis methods that can be applied by *Labfor*, so that they can be better at collecting and submitting relevant evidence for analysis. In addition, this socialization can also improve coordination between the Work Units in the regions and *Labfor*, so that the analysis process can take place faster and more efficiently. By knowing the strengths and limitations of *Labfor*, the Work Units in the regions can be more effective in collecting relevant evidence and submitting it to *Labfor* for analysis. This can contribute to improving the quality of analysis results and speeding up the investigation process.

Additionally, this social engagement can enhance the abilities of the local Work Units in leveraging modern technology and analytical techniques, enabling them to manage cases with limited witnesses more effectively. Consequently, the resolution of cases can occur more swiftly and efficiently, leading to better administration of justice. Over time, this engagement can bolster the skills and quality of *Labfor* in evaluating evidence and aiding the resolution of cases with few witnesses. Thus, it is strongly advised that this social initiative be conducted regularly and consistently in order to enhance *Labfor*'s capabilities and standards.

Regarding whether investigators require further training on how to use *Labfor* results, there is fundamentally no need for extra training in this area since the terminology used is straightforward. With language that is clear and simple, investigators can readily comprehend the findings of *Labfor*'s analysis and incorporate them into the investigative process without needing additional training. In this context, investigators can easily grasp *Labfor*'s analysis results and employ them to create a robust case. Lucid and comprehensible language can also minimize the risk of misinterpretation of the analysis results, thus allowing investigators to use *Labfor*'s findings more effectively.

In addition, investigators who are already experienced in handling cases involving *Labfor* results may not require additional training because they are already familiar with the process and language used. They can immediately understand the results of the analysis and use them in the investigation process effectively. Thus, there is no need for additional training related to the use of *Labfor* results because the language used is clear and investigators can easily understand the results of the analysis.

4.2. Discussion

The involvement of witnesses can aid in both the investigation and prosecution stages, as they offer precise and comprehensive details about what they observed. Witnesses also play a crucial role in identifying criminals and shedding light on their motives and strategies (Robert K & Irawan, 2019). In murder cases lacking witnesses, law enforcement must depend on scientific investigative techniques, known as Scientific Crime Investigation, to objectively uncover the facts. Maghantara (2023) noted that the SCI approach has been effective in the investigation and enforcement of murder cases generally. This method enables investigators to gather and examine scientific evidence more precisely and objectively, which increases the likelihood of identifying the offender and resolving the case.

The shortage of eyewitnesses in murder investigations compels the police to rely more heavily on a scientific approach, incorporating various forensic fields such as DNA testing, fingerprint analysis, ballistics, toxicology, and digital forensics. By integrating scientific methods with sophisticated investigative practices, the process of investigation becomes more organized, expediting case resolution and reinforcing evidence that can be presented in court. Amalia (2007) highlighted that evidence amenable to scientific examination includes blood and DNA. Analyses of blood and DNA possess a significant degree of accuracy. These examinations significantly bolster the evidentiary process in criminal proceedings.

The examination referenced was conducted using the forensic laboratory method. The forensic lab is crucial in solving murder cases lacking witnesses, particularly in incidents like the murder of the individual with the initials MMY, which took place in the Bandung Police jurisdiction. In the absence of eyewitnesses who can offer firsthand accounts, physical evidence obtained through laboratory analyses becomes the primary resource in the investigation.

Forensic laboratories provide much-needed technical assistance to test evidence that requires special handling, such as DNA samples, fingerprints, or ballistic analysis results. In MMY murder case, the forensic laboratory played a role in providing scientific evidence that could reconstruct the incident and help investigators identify the perpetrator, strengthen the theory of the murder, and strengthen evidence that could be used in court. With a reliable forensic laboratory, investigations become more systematic and objective so that the legal process can run more effectively even without eyewitnesses.

In the situation concerning the victim MMY, a Scientific Crime Investigation method utilizing the forensic lab can be applied by examining the Triangle of Evidence theory. This concept highlights three key aspects: the offender, the crime scene, and the victim. The Triangle of Evidence Theory clarifies how these three components including the victim, the perpetrator, and the instruments used in the crime are interconnected (Rahtinuka, 2014). The triangle of evidence is established from the mutual connections among the victim, the offender, and the instruments, each represented as a vertex of the triangle, which interact at the moment the crime takes place (Tamza & Shafira, 2023).

The following are the results of the analysis of the application of the *Scientific Crime Investigation* approach through the forensic laboratory method which is carried out by

analyzing through the theory or concept of the Triangle of Evidence (Triangle Crime Scene), namely:

4.2.1. Evidence

According to the Triangle Crime Scene Theory, a criminal case can be resolved by utilizing interconnected elements of evidence. In the situation that occurred with MMY in LP/B/421/XII/2024/JBR/RESTABESBDG/SEKTORBATUNUNGGAL, those elements include:

- a. Physical Evidence: The victim's fingerprints, DNA traces, and blood splatters around the crime scene.
- b. Record Evidence: The cellphone number of the last person who contacted the victim.
- c. Reconstructive Evidence: Injuries on the victim's neck, blood stains, and trails of blood that lead to the nearest alley.

This physical evidence is subsequently forwarded to the forensic laboratory following the established procedures within the police investigative process. The type of examination conducted at the *Labfor* focuses on forensic biology for DNA evidence and latent fingerprint analysis for identity verification.

Results from the fingerprint analysis are then compared to the national fingerprint registry (INAFIS) or matched against the fingerprints of either the suspect or the victim to determine if there is a correspondence. Finally, a report outlining the findings and their relevance to the case at hand is compiled. Engaging in a meticulous and focused fingerprint analysis procedure allows the findings to serve as compelling evidence during legal proceedings. Thus, fingerprint analysis is a critical instrument in both investigation and law enforcement.

By using the evidence triangle theory, the crime incident in this case can be reconstructed as follows:

- a. Physical evidence (fingerprints and DNA samples) shows that the perpetrator left biological traces at the crime scene.
- b. Recorded evidence (cell phone number) shows that the victim had contact with someone before the incident.
- c. Reconstruction evidence (neck wounds, blood spatter, and blood spatter tracks) shows that the perpetrator committed violence against the victim and then fled.

By combining these three elements of evidence, the Bandung Police can make a hypothesis about the crime incident and the perpetrator's identity. In this case, fingerprints and DNA samples can be used to identify the perpetrator, while the cell phone number can be used to find out the perpetrator's motives and plans (especially if the perpetrator has been traced). However, because the perpetrator was not found in the initial investigation, further investigation is needed to find the perpetrator and strengthen the existing evidence. By using the evidence triangle theory, the police can increase the possibility of finding the perpetrator and solving this crime case without witnesses.

4.2.2. Crime scene

Based on the factors surrounding the Crime Scene in MMY case (LP/B/421/XII/2024/JBR/RESTABESBDG/SEKTORBATUNUNGGAL), the findings from the investigation of this homicide are as follows:

- a. Crime Scene location: The crime occurred in a home belonging to someone who had no prior acquaintance with the victim. The residence was typically left unlocked, which explains how the victim was able to enter the place where he was discovered.
- b. Crime Scene conditions: There were blood splatters around the victim and a trail of blood leading to a nearby alley, suggesting that the assailant attacked the victim and then fled the scene.
- c. Crime Scene situation: There was an earlier location of the crime before the victim was discovered, situated in a somewhat concealed area, which allowed the assailant to carry out the act without being observed. This initial site was identified due to the blood traces that extended from where the victim was found to the nearest alley.
- d. Physical evidence: At the crime scene, fingerprints and DNA samples were located, indicating that the attacker left behind biological evidence that could help in identifying them.
- e. Crime pattern: The attacker assaulted the victim using a sharp instrument, resulting in a cut to the victim's neck.

From the crime scene analysis, a hypothesis can be made about the perpetrator and the motive for the crime. For example:

- a. The perpetrator may have a relationship with the victim, so he committed the crime with personal motives.
- b. The perpetrator may have a violent background or have aggressive tendencies.
- c. The perpetrator may have committed the crime spontaneously or planned.
- d. The perpetrator is familiar with the location around the location of the incident

By analyzing the crime scene and the evidence found, it can increase the possibility of finding the perpetrator and solving the crime case.

4.2.3. Perpetrator

Based on the perpetrator elements, the findings from the investigation of this homicide case are as follows:

- a. The perpetrator's identity: Not yet known for certain, but fingerprints and DNA samples found at the crime scene can be used for identification.
- b. The perpetrator's motive: May have a personal motive or grudge against the victim, or may have committed the crime spontaneously.
- c. The perpetrator's behavior: The perpetrator committed violence against the victim using a sharp object, causing a wound to the victim's neck.
- d. The perpetrator's ability: The perpetrator may have the ability to commit violence or have a background of violence, or be accustomed to violent environmental situations.

From the perpetrator analysis, there are several hypotheses about the characteristics of the perpetrator and his possible identity. For example:

- a. The perpetrator may have a history of violence or have aggressive tendencies.
- b. The perpetrator may have a relationship with the victim or have personal motives.
- c. The perpetrator may have the ability to commit crimes using sharp objects.

By analyzing the perpetrator's elements, this can increase the possibility of finding the perpetrator's identity and solving the crime case. In this case, the cellphone number found as the victim's last contact can be an important clue to finding the perpetrator's identity.

The utilization of this concept can significantly aid in the investigative process, particularly in revealing the phone number that was last dialed by the victim, which was discovered at the crime scene. It is well-known that after tracking down the suspect, several key findings emerged. The victim was recognized as having been in contact with an individual from Bandung, although they did not live in that city. Through the investigation, the local police team successfully identified the suspect through fingerprints located on plastic at the crime scene. The examination results indicated that the fingerprints corresponded to those of the suspect. Further inquiry uncovered that the suspect was a sex worker at a hotel in Bandung. The police team located and apprehended the suspect in Bandung Regency. The suspect confessed to the crime, claiming it was driven by anger after the victim failed to uphold their agreement to sell drugs. The suspect inflicted wounds to the victim's neck and back before escaping, leaving the victim deceased. The suspect's account aligns with the outcomes of the crime scene investigation and the evidence collected.

In addition, the employment of forensic lab techniques is crucial, especially for addressing crimes that lack witnesses. Analyzing evidence found at the scene is vital for uncovering the individuals responsible for the crime. This was discussed earlier. However, the effectiveness of forensic laboratory tests can be affected by various facilitating and obstructive elements. From interviews conducted with sources such as the Head of the Criminal Investigation Division of the Bandung Police, the Head of *Criminal and Violence Unit* of the Bandung Police, and Officers and Members of the Criminal and Violence Unit, several significant insights were shared concerning the factors that either support or hinder the resolution of murder cases without witnesses, specifically related to case LP/B/421/XII/2024 concerning the victim MMY.

Inhibiting factors in the application of forensic methods are a challenge in itself in investigating unwitnessed murder cases, especially in terms of time and coordination. From the results of interviews conducted with the Head of the Criminal Investigation Unit of the Bandung Police and the Head of Criminal and Violence Unit of the Bandung Police, it was revealed that the factor that inhibits the forensic laboratory method in solving unwitnessed murder cases in terms of time is the duration required to conduct the analysis and produce accurate results. The time period between submitting a request for analysis and receiving the results can be a significant obstacle in the investigation process. This can slow down the investigation and affect the performance of the investigation, because investigators have to wait for the results of the analysis which may take a long time.

Meanwhile, regarding coordination, one major obstacle to collaboration between the Bandung Police investigation unit and the Forensic Laboratory (*Labfor*) team is communication. This often presents a notable issue during murder investigations where there are no witnesses. The problem is exacerbated when communication relies on letters or less immediate forms, resulting in challenges in acquiring timely information about the analysis's progress. Such a scenario can affect the investigative process since detectives require quick and precise access to information about the analysis results to make informed and effective decisions. Therefore, it is crucial for investigators and the *Labfor* team to communicate effectively to ensure that the analytical results are utilized efficiently in the investigation.

Conversely, a key factor that greatly influences the success of the Forensic Laboratory (*Labfor*) in resolving a case is speed. This efficiency allows the Bandung Police investigation team to promptly receive reports on evidence analysis, enabling them to quickly understand the findings and further advance the case. The rapid delivery of analysis results from *Labfor* is vital as it can accelerate both the investigative process and the resolution of the case.

With the speed of analysis results, investigators can make more precise and efficient decisions during the investigation. The Bandung Police can use the analysis results to identify suspects, collect additional evidence, and build a strong case against the perpetrators of the crime. In addition, the speed of delivery of results from the *Labfor* also contributes to increasing public trust in law enforcement agencies.

The last topic is about strengthening strategies. Strengthening strategies are plans or approaches that aim to improve the capabilities, resilience, or strength of a system, organization, or individual. In a forensic laboratory environment, strengthening strategies can include several things such as developing the capabilities and skills of laboratory personnel, updating laboratory technology and equipment, improving procedures and processes carried out in the lab, strengthening collaboration and communication with external parties, or improving the quality and accuracy of analysis results. Through the implementation of strengthening strategies, forensic laboratories can improve their capabilities and performance, so that they are able to make a more significant contribution to law enforcement and case resolution.

Based on the results of interviews conducted with the ranks of the Bandung Police Criminal Investigation Unit, the suggestion that can be submitted so that the Forensic Laboratory (*Labfor*) method becomes more effective and efficient in situations where murder cases occur with few witnesses or even no witnesses at all is to hold socialization activities to the Work Units in the relevant areas regarding the update of the analysis methods owned by *Labfor*. In this way, the Work Units in the regions can understand the strengths and limitations of *Labfor* in examining evidence found at the scene of the incident (TKP).

Furthermore, related to the topic of whether investigators need additional training related to the use of *Labfor* results, based on the opinion of the resource person, namely the Bandung Police Criminal Investigation Unit Investigator, it was stated that basically there is no need for additional training related to the use of Forensic Laboratory (*Labfor*) results because the language used is clear and easy to understand. With clear and easy-to-understand language, investigators can immediately understand the results of the *Labfor* analysis and use them in the investigation process without the need for additional training.

In this case, investigators can easily understand the results of the *Labfor* analysis and use them to build a strong case. Clear and easy-to-understand language can also help reduce misinterpretation of the analysis results, so that investigators can be more effective in utilizing the *Labfor* results. In addition, investigators at the Bandung Police who are experienced in handling cases involving *Labfor* results may not need additional training because they are familiar with the process and language used. They can immediately understand the analysis results and use them in the investigation process effectively.

Thus, there is no need for additional training related to the use of *Labfor* results because the language used is clear and investigators can easily understand the analysis results. This can help increase the efficiency and effectiveness of the investigation process, so that cases can be revealed more quickly and accurately. However, in his research, Maulana Mukarom (2023) revealed that improving investigators' skills in conducting scientific research or CSI on crimes is also necessary. With the right human resource strengthening, the police can improve the effectiveness and efficiency in investigating criminal cases such as murder. So, with this, it is also necessary to remember that strengthening human resources is not necessary for officers who are already experienced, but for new or less experienced investigators, this may be a consideration, because they still need additional training to understand the results of the *Labfor* analysis better.

5. Conclusion

This study demonstrates that forensic laboratory methods serve as critical pillars in solving witness-less murder cases, as evidenced by the MMY murder case in Polrestabes Bandung. When eyewitness testimony is unavailable, forensic laboratories become the primary means of objective fact-finding through scientific analysis of physical evidence including DNA, fingerprints, and ballistic materials. These laboratory examinations enable systematic case reconstruction, perpetrator identification, and the development of court-admissible evidence, transforming complex investigations into structured, science-based processes.

However, the effectiveness of forensic laboratory utilization faces significant challenges, particularly lengthy analysis turnaround times and coordination inefficiencies between investigators and laboratory teams. Time efficiency emerges as the most critical factor determining optimal forensic outcomes, as delayed results can compromise investigation momentum and evidence integrity. To address these limitations, strategic improvements must focus on enhancing communication protocols, updating regional work units on advanced analytical methods, and developing integrated investigation management systems.

The path forward requires comprehensive strengthening of forensic laboratory methods through integrated Standard Operating Procedures, advanced technological support, and enhanced cross-unit communication. By creating a proactive investigation ecosystem that combines scientific rigor with operational efficiency, law enforcement agencies can significantly improve their capacity to solve complex witness-less cases, ultimately strengthening the overall effectiveness of criminal justice processes.

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