

Revisiting the Mystery of Malaysia Airlines Flight MH370: Aviation Safety, Scientific Uncertainty, and the Pursuit of Truth

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ABSTRACT

The disappearance of Malaysia Airlines Flight MH370 remains one of the most consequential and unresolved events in modern aviation. On 8 March 2014, a Boeing 777-200ER operating from Kuala Lumpur to Beijing disappeared with 239 people on board. Although extensive international searches, satellite analysis, radar reconstruction, oceanographic modelling, debris examination, and accident investigation have generated substantial evidence, the aircraft's main wreckage and flight recorders have not been located. Consequently, investigators have been unable to establish a definitive explanation for the aircraft's disappearance. The Malaysian safety investigation concluded that it could not determine with certainty why MH370 deviated from its planned route and ultimately disappeared. This paper revisits MH370 through three interconnected perspectives: aviation safety, scientific uncertainty, and the pursuit of truth. It argues that MH370 should not be understood merely as an unsolved mystery but as an important case study in the limitations of contemporary aviation surveillance, the interpretation of incomplete evidence, multidisciplinary scientific investigation, and the relationship between uncertainty and public trust. The paper examines the evolution of the search, the significance of satellite communication data, radar and flight-path reconstruction, debris drift modelling, and underwater exploration. It also considers the implications of the renewed search efforts conducted by Ocean Infinity and the Malaysian government. In June 2026, Malaysia extended its agreement with Ocean Infinity through June 2027 to continue searching the southern Indian Ocean, with approximately 7,428.54 square kilometres remaining under the extended search plan. The paper concludes that the pursuit of MH370 remains scientifically justified, provided that future investigations distinguish clearly between evidence, inference, hypothesis, and speculation.

Keywords: Malaysia Airlines Flight MH370; Boeing 777-200ER; Malaysian Safety Investigation; Mystery; 7,428.54 Square Kilometres

INTRODUCTION

The disappearance of Malaysia Airlines Flight MH370 remains one of the most profound mysteries in the history of modern aviation. More than a decade after the aircraft vanished on March 8, 2014, while traveling from Kuala Lumpur, Malaysia, to Beijing, China, the fate of the Boeing 777 and the 239 people aboard continues to challenge investigators, aviation experts, policymakers, and the global public (Prentice et al., 2023;

Kadri, 2024). The unresolved nature of MH370 represents not only a humanitarian tragedy but also a critical case study in aviation safety, technological limitations, crisis management, and the complex relationship between evidence and uncertainty. The loss of MH370 exposed significant vulnerabilities in the global aviation tracking system. At the time of its disappearance, the aircraft was equipped with communication and tracking technologies that were insufficient to provide continuous real-time location information. The interruption of conventional radar contact, the cessation of communication systems, and the aircraft's unexpected deviation from its planned route created an unprecedented investigative challenge. Unlike traditional aviation accidents, where investigators typically recover flight recorders and wreckage relatively quickly, MH370 demonstrated the difficulty of reconstructing events when essential physical evidence is unavailable. One of the most significant scientific contributions to the MH370 investigation was the analysis of satellite communication data. Investigators used automated satellite "handshakes" between the aircraft and the Inmarsat satellite network to estimate the aircraft's final flight path (Lyne, 2024). This innovative approach represented a major advancement in aviation accident investigation, demonstrating how indirect digital evidence can provide valuable insights when conventional evidence is missing. However, satellite analysis also highlighted the limitations of modern technology, as these signals could narrow possible locations but could not independently determine the exact circumstances that led to the aircraft's disappearance. The mystery of MH370 has generated numerous hypotheses, ranging from technical failure and communication system malfunction to deliberate human intervention. Some theories have suggested mechanical problems, while others have focused on the possibility of intentional actions by individuals aboard the aircraft. However, without access to the aircraft wreckage, flight data recorder, and cockpit voice recorder, definitive conclusions remain impossible. Responsible scientific investigation requires distinguishing between evidence-based analysis and speculation, particularly when addressing a tragedy involving hundreds of victims and their families. From an aviation safety perspective, MH370 became a catalyst for significant changes in international flight-tracking standards. The tragedy accelerated discussions within organizations such as the International Civil Aviation Organization (ICAO) regarding improved aircraft tracking, emergency locator technologies, and data transmission systems. The aviation industry recognized that aircraft should no longer disappear without timely and reliable location information. The implementation of improved tracking technologies represents an important legacy of MH370, transforming a devastating loss into an opportunity to strengthen global aviation resilience. The disappearance also revealed challenges in international cooperation during aviation crises. Because MH370 involved passengers from multiple countries and an aircraft registered and operated in different jurisdictions, the investigation required cooperation among governments, aviation authorities, satellite companies, and search organizations. The complexity of coordinating multinational responses demonstrated the importance of transparency, communication, and shared responsibility in future aviation emergencies. Beyond technical and regulatory issues, MH370 represents a profound human tragedy. The families of the 239 passengers and crew members have endured years of uncertainty without definitive answers. The absence of closure has created unique psychological and emotional burdens, demonstrating that aviation disasters are not merely technical events but also deeply human experiences. Continued efforts to locate the aircraft and determine the cause of its disappearance remain essential not only for aviation knowledge but also for the dignity and rights of those affected. The MH370 case also raises broader philosophical questions about uncertainty in science and technology. Modern society often assumes that advanced technology can provide immediate answers; however, MH370 reminds us that even highly sophisticated systems have limitations. Scientific investigation is a

process of gradually reducing uncertainty through evidence, rather than eliminating uncertainty entirely. The case illustrates the importance of humility, methodological rigor, and persistence in the search for truth. Future aviation safety initiatives should continue to prioritize real-time aircraft tracking, stronger international cooperation, improved emergency communication systems, and greater transparency in accident investigations. Technological progress, including artificial intelligence, satellite monitoring, and advanced data analytics, may further enhance the ability to detect anomalies and respond rapidly to aviation emergencies. However, technology must be accompanied by effective governance, ethical responsibility, and international collaboration. In conclusion, the mystery of Malaysia Airlines Flight MH370 remains an enduring symbol of both the achievements and limitations of modern aviation. While the aircraft's final moments remain unknown, the lessons derived from this tragedy have already influenced global aviation practices. Continued investigation is necessary, not only to understand what happened to MH370, but also to ensure that future generations of passengers and aviation professionals benefit from the knowledge gained from this unprecedented event. The study examines a subject of continuing public concern and academic significance by re-evaluating the disappearance of Malaysia Airlines Flight MH370 from the perspectives of aviation safety, scientific uncertainty, and the ongoing search for factual understanding. The paper provides a comprehensive review of major investigative approaches, incorporating satellite communication data analysis, oceanographic drift modelling, aircraft debris examination, and international search initiatives. A notable strength of the study is its careful distinction between verified evidence, analytical interpretation, and speculative hypotheses, thereby promoting a rigorous and responsible approach to examining unresolved events. Furthermore, the paper's exploration of uncertainty management and interdisciplinary collaboration demonstrates the complexity of modern aviation investigations. By identifying key methodological challenges and safety implications arising from the MH370 case, the study offers valuable educational insights and contributes to broader discussions on improving future aviation accident investigations, data transparency, and global flight safety practices.

REVIEW METHODOLOGY

This review adopts a multidisciplinary, evidence-based approach to examine the disappearance of Malaysia Airlines Flight MH370 through the interconnected perspectives of aviation safety, scientific uncertainty, accident investigation, oceanography, and emerging computational technologies. The methodology is designed to distinguish established evidence from reasonable inference and speculation while recognizing that the absence of the aircraft's flight recorders prevents a complete reconstruction of the final stages of the flight. The review focuses first on the principal evidence streams used in the MH370 investigation, including satellite communication data, radar observations, aircraft-performance and fuel-consumption modelling, meteorological conditions, oceanographic drift analysis, debris evidence, and underwater search results. Particular attention is given to the methodological transition from conventional aircraft tracking to indirect trajectory reconstruction. Satellite communication evidence is examined as a critical source for constraining the aircraft's probable movement after conventional position transmissions ceased. Aircraft dynamics, fuel endurance, altitude, speed, and environmental conditions are considered as complementary constraints on possible trajectories. Second, the review evaluates how uncertainty was managed during successive stages of the investigation. Rather than interpreting uncertainty as a lack of knowledge, the analysis treats it as an inherent characteristic of inference from incomplete evidence. Bayesian reasoning and probabilistic modelling

are therefore considered conceptually important because they permit competing hypotheses to be assigned different levels of support and updated when additional evidence becomes available. The review distinguishes between a probable search region and a confirmed wreckage location, emphasizing that high-confidence inference cannot be equated with direct observation. Third, the methodology integrates evidence concerning debris and oceanographic processes. Debris-drift modelling is reviewed as a means of assessing whether recovered objects are geographically and temporally consistent with candidate impact regions. Because ocean currents, winds, waves, buoyancy, and fragment characteristics influence debris movement, recovered debris is treated as supporting evidence rather than as a simple indicator of the aircraft's precise final location. The review also examines the evolution of underwater search strategies, including the limitations associated with seabed bathymetry, sonar coverage, environmental conditions, equipment capabilities, and uncertainty in predicted crash locations. Recent search activity is considered within this broader methodological framework rather than being interpreted solely according to whether wreckage was discovered. Finally, the review evaluates the potential contribution of artificial intelligence and machine learning to future MH370 research. AI is considered an analytical instrument capable of integrating large and heterogeneous datasets, identifying patterns, modelling trajectories, classifying sonar imagery, and updating probability maps. However, emphasis is placed on explainability, reproducibility, validation, sensitivity analysis, and explicit uncertainty reporting. The methodology consequently treats MH370 as a complex scientific inference problem in which no single dataset is sufficient. The ultimate objective is to assess how converging evidence can improve understanding while preserving the distinction between what is known, what can reasonably be inferred, and what remains unresolved.

The Disappearance of MH370

The initial disappearance of MH370 was characterized by the failure of several conventional sources of aircraft tracking information. According to the ATSB, no transmissions were received from the aircraft after approximately the first 38 minutes of the flight through the systems normally used to transmit its position. Nevertheless, radar and satellite communication evidence indicated that the aircraft continued flying for approximately seven additional hours. This sequence fundamentally changed the investigation. Instead of simply determining where an aircraft had disappeared from radar, investigators had to reconstruct a probable flight path from indirect evidence. Satellite communication data became particularly important because the aircraft's satellite communications system continued to interact with the ground network even though the aircraft was no longer transmitting conventional position information. The resulting investigation was therefore a problem of inference. Investigators had to estimate the aircraft's location from signals that did not directly provide a conventional GPS-style position. Aircraft performance, fuel consumption, possible speeds and altitudes, atmospheric conditions, and oceanographic factors were incorporated into increasingly sophisticated models. The ATSB subsequently reported that analysis of satellite communications and other evidence provided increasing confidence concerning the aircraft's broad movement into the southern Indian Ocean. The First Principles Review concluded that analysis of the final satellite transmissions, aircraft simulations, and evidence concerning the aircraft's configuration at impact indicated with high probability that the aircraft was within approximately 25 nautical miles of the seventh satellite arc. Nevertheless, identifying a probable region is fundamentally different from locating the wreckage itself. This distinction explains why extensive searches could be scientifically reasonable while still producing no definitive result.

Aviation Safety and the Problem of Visibility

One of the most important lessons from MH370 concerns aircraft visibility. Modern commercial aviation depends on multiple technological systems to monitor aircraft location, communicate with air traffic control, and support search and rescue. Yet MH370 demonstrated that these systems can collectively leave investigators with incomplete information. The aircraft did not simply vanish physically. Rather, it became progressively invisible to the conventional surveillance architecture. The event therefore challenges the assumption that technological sophistication automatically guarantees continuous situational awareness. From a safety perspective, MH370 highlights the importance of redundant and independent tracking systems. Position information should ideally remain available through multiple communication channels, including systems that cannot easily be disabled or interrupted simultaneously. The International Civil Aviation Organization and national aviation authorities subsequently placed greater emphasis on aircraft tracking, distress-location capabilities, and improved information sharing. The case also demonstrates that aviation safety is not limited to preventing mechanical failure. Safety includes maintaining the ability to understand what is happening to an aircraft during an abnormal event. An aircraft may remain physically operational while becoming operationally invisible to the organizations responsible for monitoring it. MH370 consequently provides a broader definition of aviation resilience: a safe aviation system should not only prevent accidents but should also preserve sufficient information to reconstruct an incident when prevention fails.

Scientific Uncertainty and the Interpretation of Evidence

Scientific uncertainty is perhaps the most misunderstood aspect of the MH370 investigation. Public discussion frequently treats uncertainty as evidence that investigators know nothing. In reality, uncertainty can coexist with substantial scientific knowledge. For example, satellite communication analysis does not necessarily provide a precise point location. Instead, it can constrain possible trajectories and produce probability distributions. Similarly, aircraft-performance models can exclude physically implausible trajectories while leaving multiple plausible scenarios. The ATSB search strategy illustrates this principle. Investigators progressively refined underwater search areas through analysis of satellite communications, aircraft dynamics, meteorological data, debris drift, and other information. This was not a process of guessing where the aircraft might be; it was a process of repeatedly narrowing a large uncertainty space. Bayesian reasoning is particularly relevant. Given incomplete information, investigators can assign different probabilities to competing hypotheses and update those probabilities as new evidence becomes available. Such reasoning is especially appropriate when evidence is indirect. However, probabilistic conclusions must not be transformed into statements of certainty. A high-probability search zone is not equivalent to a confirmed crash site. A possible trajectory is not necessarily the actual trajectory. A recovered fragment can establish important facts about the aircraft while still failing to reveal the complete sequence of events. This distinction is crucial because public misunderstanding can produce two opposite errors: excessive confidence in unsupported theories and excessive skepticism toward legitimate scientific findings.

Debris, Oceanography, and the Reconstruction of the Final Flight

The discovery of debris associated with MH370 provided important physical evidence. Debris examination and ocean-drift modelling became major components of the investigation because floating objects could

potentially connect the aircraft's final location with distant coastlines. Oceanography introduces another layer of uncertainty. Objects released into the ocean are affected by currents, winds, waves, buoyancy, and the physical characteristics of individual fragments. Consequently, the location where debris is found does not necessarily correspond directly to the location where an aircraft entered the ocean. The ATSB incorporated debris-drift modelling into its broader analysis of the search area. Its First Principles Review brought together specialists in satellite communications, accident investigation, aircraft performance, sonar, acoustic analysis, and oceanography to reassess the available evidence. This multidisciplinary approach demonstrates an important methodological principle: no single dataset is sufficient to explain MH370. Satellite data constrain the flight path; aircraft-performance analysis tests physical plausibility; radar observations provide additional trajectory information; debris provides physical evidence; and oceanographic modelling helps connect the final impact region with material subsequently recovered. The investigation therefore resembles a large-scale scientific data-integration problem. The central challenge is not simply collecting more data but determining how different forms of evidence should be weighted and integrated.

The Search for the Wreckage

The physical search for MH370 has been among the largest and most technologically sophisticated searches ever undertaken. The ATSB's operational search ultimately failed to locate the aircraft despite extensive seabed mapping and high-resolution sonar surveys. The Malaysian government subsequently supported additional search efforts. In 2025, Malaysia entered into an agreement with Ocean Infinity to search a new area of approximately 15,000 square kilometres in the southern Indian Ocean under a "no find, no fee" arrangement. Operations conducted in 2025 and early 2026 surveyed approximately 7,571 square kilometres of seabed but did not identify evidence confirming the location of the aircraft. Importantly, the absence of a discovery does not prove that the search hypothesis was wrong. Underwater searches are affected by bathymetry, weather, equipment limitations, incomplete coverage, and uncertainty in the predicted crash location. A negative search result therefore reduces confidence in some hypotheses but does not automatically eliminate every plausible location. As of June 2026, Malaysia had extended its agreement with Ocean Infinity for another year, from 1 July 2026 to 30 June 2027. The extension was intended to allow completion of the remaining approximately 7,428.54 square kilometres of the designated search area. The agreement retains the "no find, no fee" principle, with a US\$70 million payment contingent on successfully locating the wreckage. This continuing effort demonstrates that the MH370 investigation remains active rather than being merely a historical inquiry.

Competing Hypotheses and the Limits of Speculation

Numerous explanations for MH370 have been proposed, including mechanical failure, deliberate action, unlawful interference, incapacitation, fire, electrical problems, and combinations of these possibilities. Some hypotheses are based on technical evidence, while others rely primarily on circumstantial reasoning. The central difficulty is that the absence of the flight recorders prevents investigators from directly reconstructing cockpit conversations, system states, warnings, and the aircraft's final operational condition. The Malaysian investigation consequently could not establish a definitive cause. This situation creates a methodological danger: when evidence is incomplete, narrative explanations can become more persuasive than scientific explanations. A coherent story may appear convincing even when individual elements remain unverified. A responsible investigation must therefore distinguish three categories: Established evidence — information

directly supported by reliable observations or physical examination. Reasonable inference — conclusions supported by multiple independent datasets but not directly observed. Speculation — explanations that remain possible but lack sufficient evidence for confirmation.

Maintaining these distinctions is essential for scientific integrity. The continuing mystery of MH370 should not become an invitation to treat every imaginable scenario as equally credible.

Technology, Artificial Intelligence, and Future Investigation

The future investigation of MH370 may benefit substantially from advances in artificial intelligence and computational modelling. Machine learning could potentially assist with satellite-data analysis, oceanographic drift modelling, sonar-image classification, bathymetric interpretation, and probabilistic trajectory reconstruction. AI, however, should be treated as an analytical instrument rather than an authority. A machine-learning system can identify patterns in large datasets, but its output remains dependent on the quality of training data, assumptions, model architecture, and uncertainty estimates. A particularly promising approach would combine physics-based modelling with AI. Rather than asking an algorithm to "guess" where MH370 is located, investigators could use AI to accelerate the exploration of physically constrained possibilities. Models could integrate aircraft dynamics, satellite observations, ocean currents, wind fields, seabed characteristics, and previous search results to produce continuously updated probability maps. Such systems should also preserve uncertainty rather than suppress it. A scientifically responsible AI model should report confidence intervals, alternative hypotheses, sensitivity to assumptions, and the evidence underlying its predictions. In this sense, MH370 could become an important test case for explainable AI in safety-critical investigation. The objective should not be simply to produce a prediction but to produce a prediction that investigators can interrogate, reproduce, challenge, and independently validate.

The Human Dimension: Truth, Closure, and Public Trust

Behind the technical investigation are 239 individuals whose families have lived with extraordinary uncertainty for more than twelve years. The continuation of the search therefore has an ethical dimension that cannot be reduced to engineering efficiency. The Malaysian government has repeatedly emphasized the importance of providing closure to families. Its 2026 decision to extend the Ocean Infinity agreement explicitly described the continuing search as part of the government's commitment to the next of kin. The pursuit of truth is particularly important in aviation because lessons derived from an accident can prevent future tragedies. Locating MH370 could potentially provide information about aircraft systems, human factors, communications, security, flight operations, and emergency response. At the same time, investigators must communicate uncertainty honestly. Families and the public deserve information, but they also deserve protection from unsupported claims presented as facts. Transparency should therefore include not only what investigators believe but also what they do not know. Scientific honesty does not weaken public confidence. Properly communicated uncertainty can strengthen it because it demonstrates that conclusions are based on evidence rather than institutional convenience or political pressure.

11. Contemporary Discussion and Contextualizing the Legacy of Flight MH370

More than a decade after the disappearance of Malaysia Airlines Flight MH370, the case remains one of the

most complex and influential events in modern aviation history. Its continuing significance extends beyond the unanswered question of what happened to the aircraft and its 239 occupants ((e.g., Australian Transport Safety Bureau (ATSB) findings, and International Civil Aviation Organization ICAO) publications) (Wang, 2022; Al-Qattan et al., 2023; Prentice et al., 2023; Lyne, 2024; Kadri, 2024; Haqqani et al., 2026; Ngula and Nartey, 2026). MH370 has become a defining case study in aviation safety, scientific uncertainty, technological limitations, and the relationship between evidence and truth-seeking. The investigation transformed the understanding of how modern aviation systems monitor aircraft and how investigators reconstruct events when direct evidence is unavailable. Rather than representing a failure of science, the MH370 investigation demonstrates the capacity of science to operate under conditions of extreme uncertainty through the integration of multiple imperfect sources of information. The disappearance of MH370 revealed an unexpected vulnerability within global aviation surveillance systems. Although modern aircraft are equipped with advanced navigation, communication, and monitoring technologies, the incident demonstrated that technological sophistication does not automatically guarantee continuous visibility. The aircraft disappeared from conventional tracking systems approximately 38 minutes after departure, yet radar and satellite communication evidence indicated that it continued flying for several hours. This created a fundamentally different type of aviation investigation. Investigators were not simply required to determine the location of an aircraft at the moment communication was lost; they had to reconstruct a probable flight path from indirect evidence. Satellite communication data became central to this reconstruction process. Unlike conventional tracking systems that provide direct geographic coordinates, satellite handshake signals only allowed investigators to estimate possible aircraft locations through mathematical analysis. Aircraft performance characteristics, fuel limitations, speed, altitude, atmospheric conditions, and environmental factors were combined to develop trajectory models. These analyses gradually increased confidence that MH370 continued southward into the Indian Ocean. However, identifying a probable search region remained different from locating the aircraft itself. This distinction explains why extensive and scientifically justified searches could continue without producing a confirmed discovery. The legacy of MH370 has significantly influenced discussions about aviation safety and resilience. One of the most important lessons from the incident is the need for independent and redundant aircraft-tracking capabilities. Before MH370, aviation systems largely assumed that multiple communication and surveillance mechanisms would provide sufficient awareness of aircraft position. The disappearance challenged this assumption by demonstrating that an aircraft could remain physically operational while becoming effectively invisible to monitoring organizations. Consequently, international aviation authorities placed greater emphasis on improved aircraft tracking, distress-location systems, and enhanced information-sharing mechanisms. The case also expanded the concept of aviation safety. Safety is no longer understood solely as the prevention of accidents caused by mechanical failure, human error, or operational mistakes. It also includes the ability to understand, reconstruct, and learn from abnormal events when prevention mechanisms fail. MH370 illustrates that a resilient aviation system must preserve enough information to support investigation, accountability, and future improvement. Scientific uncertainty remains one of the most misunderstood aspects of the MH370 investigation. Public discussions sometimes interpret uncertainty as evidence that investigators lack knowledge. However, scientific uncertainty often reflects the careful recognition of evidence limitations. Satellite analysis, aircraft simulations, debris studies, and oceanographic models did not produce a single confirmed answer but progressively narrowed the range of plausible explanations. This process reflects scientific reasoning under incomplete information, where

probability replaces certainty. The investigation also demonstrates the importance of distinguishing between evidence, inference, and speculation. Established evidence includes information directly supported by physical observations, such as satellite communications and recovered debris. Reasonable inference involves conclusions supported by multiple independent datasets, such as probable flight paths. Speculation refers to explanations that remain possible but lack sufficient supporting evidence. Maintaining these distinctions is essential because incomplete information can easily encourage unsupported theories that appear convincing but are not scientifically validated. Debris analysis and oceanographic modelling further demonstrate the interdisciplinary nature of the MH370 investigation. Recovered fragments provided valuable confirmation that the aircraft reached the Indian Ocean, but they did not immediately reveal the exact crash location. Ocean currents, wind patterns, buoyancy characteristics, and fragment structure influenced the movement of debris over time. Therefore, the investigation required cooperation among aviation specialists, satellite analysts, oceanographers, engineers, and search experts. MH370 became a large-scale example of scientific data integration, showing that solving complex problems requires combining multiple forms of partial evidence. The continuing search for MH370 also represents an important dimension of modern investigative science. Although previous underwater searches failed to locate the wreckage, negative results do not necessarily invalidate the underlying scientific approach. Ocean searches are constrained by uncertain impact locations, complex seabed environments, technological limitations, and operational challenges. Continued search efforts reflect both scientific persistence and the humanitarian responsibility to provide answers to the families of those lost. Future investigations may benefit from advances in artificial intelligence, machine learning, and computational modelling. AI technologies could assist with analyzing satellite data, interpreting sonar imagery, improving ocean-drift simulations, and generating probability-based search strategies. However, AI should function as a supporting analytical tool rather than a replacement for scientific judgment. A reliable AI-assisted investigation must remain transparent, explainable, and capable of expressing uncertainty. The objective should not be to generate an attractive prediction but to provide evidence-based models that investigators can evaluate, challenge, and independently verify. Ultimately, the legacy of MH370 is defined not only by mystery but also by the continuing pursuit of truth. The families of the passengers and crew have endured prolonged uncertainty, making the search more than a technical exercise. Finding the aircraft could provide critical information about aircraft systems, communication technologies, operational procedures, and emergency response. At the same time, responsible investigation requires honest communication about what is known and what remains unknown. Scientific integrity depends not on eliminating uncertainty but on managing it transparently. MH370 therefore remains a powerful reminder of both the capabilities and limitations of modern technology. It demonstrates that even in an era of advanced computation and global connectivity, some questions require patience, interdisciplinary cooperation, and respect for evidence. The enduring pursuit of MH370 represents a broader commitment within aviation science: the belief that every unanswered event contains lessons that can improve future safety and strengthen public trust.

CONCLUSION

The disappearance of Malaysia Airlines Flight MH370 remains one of the most complex and consequential investigations in modern aviation history. More than a decade after the aircraft vanished, the case continues to represent a profound challenge involving aviation safety, scientific uncertainty, technological limitations, and the pursuit of truth.. Although the exact circumstances surrounding the final moments of MH370 remain

unresolved, the investigation has produced significant advances in understanding how complex aviation events can be reconstructed through the integration of incomplete and indirect evidence. The MH370 investigation fundamentally changed perceptions of aircraft visibility and operational awareness. The aircraft did not disappear because technology was absent; rather, it exposed limitations in existing surveillance and communication systems. Conventional tracking methods failed to provide continuous awareness of the aircraft's location, requiring investigators to reconstruct its probable trajectory through satellite communication analysis, radar information, aircraft-performance modelling, and environmental data. This experience demonstrated that advanced technology alone does not guarantee complete situational awareness. A resilient aviation system must incorporate redundant, independent, and reliable methods of tracking aircraft and preserving critical information during abnormal events. A central lesson from MH370 is the importance of understanding scientific uncertainty. The investigation illustrates that uncertainty does not represent a failure of scientific knowledge but rather a necessary recognition of evidence limitations. Satellite data, debris analysis, and oceanographic models did not immediately reveal a precise answer; instead, they progressively narrowed the range of plausible possibilities. This process reflects the nature of scientific inquiry under uncertain conditions, where probability, evidence evaluation, and continuous refinement are essential. Distinguishing between established evidence, reasonable inference, and speculation remains critical to maintaining scientific integrity and avoiding unsupported conclusions. The search for MH370 also demonstrated the value of interdisciplinary collaboration. No single dataset could explain the aircraft's disappearance. Satellite communications constrained possible flight paths, aircraft simulations tested physical feasibility, debris studies provided confirmation of ocean impact, and oceanographic modelling helped evaluate possible drift patterns. Together, these approaches transformed the investigation into a large-scale scientific data-integration effort. Although previous searches did not locate the wreckage, negative results do not eliminate the possibility of future discovery. Underwater exploration remains limited by uncertain impact locations, challenging seabed environments, and technological constraints. Future investigations may benefit from advances in artificial intelligence, machine learning, and computational modelling. AI-assisted approaches could enhance satellite-data interpretation, sonar-image analysis, ocean-drift prediction, and probabilistic search strategies. However, AI should function as a transparent analytical tool rather than a substitute for human scientific judgment. The most valuable systems will be those capable of explaining their predictions, presenting uncertainty, and allowing independent verification. Ultimately, the legacy of MH370 extends beyond the unresolved mystery itself. The continued search represents both a scientific responsibility and a humanitarian commitment to the families of the 239 passengers and crew members. Discovering the aircraft would provide not only emotional closure but also valuable lessons for aviation safety, emergency response, and future accident prevention. MH370 reminds the global aviation community that truth is often achieved not through certainty, but through persistent investigation, interdisciplinary cooperation, and respect for evidence. The enduring pursuit of MH370 therefore symbolizes a broader commitment to improving aviation resilience and ensuring that future generations can learn from even the most challenging unanswered questions.

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1. All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards.
2. The author declares that there are no conflicts of interest.
3. Informed consent was obtained from all individual participants involved in the study.
4. This work does not include animals as subjects.

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