

HALAL FORENSIC ANALYSIS OF NON-COMPLIANCE WITH MINERAL STANDARDS IN MINERAL WATER: A CASE STUDY OF PUBLIC PROSECUTOR V PEK WOEI YI & MALEE MINERAL WATER SDN. BHD. (2022)

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ABSTRACT

Halal forensic studies have focused primarily on the detection of banned ingredients in food using DNA authentication and chemical detection methods. The utilisation of forensic science, as part of the general idea of *halalan tayyiban* to assess food safety is seen to have received comparatively less attention. This paper discusses the case of *Public Prosecutor v Pek Woei Yi & Malee Mineral Water Sdn. Bhd.* (2022) 1 LNS 1111, the Court determined that detection of sulphate and chloride in bottled mineral water constituted a breach that could be remedied by ensuring their concentration in the water is maintained within safe limits, as opposed to being completely eliminated. The research method used is qualitative approach with doctrinal and document analysis methods on the sources of the study, which are the court records, scientific research, and Halal Regulation. The analysis demonstrates that laboratory results can be crucial evidence in a case of regulatory noncompliance, even if the detected substance is a naturally occurring entity and is not likely to cause any adverse health impacts at low levels. The case also exemplifies how scientific evaluation, typically risk assessment, and legal interpretation, typically stressing legal conformance to the current law, diverge. Overall, the case indicates that the halal assurance should not be limited to the verification of food ingredients only but should also take into account the food safety and quality issues from the *halalan tayyiban* point of view. Based on this, the paper suggests that the scope of halal forensic science should be expanded to involve laboratory-based food safety parameter assessment process as part of the halal certification process. This could help to increase public trust in halal certification and facilitate the achievement of the *Maqasid Syariah*, which is taken up in this study, namely protecting human well-being.

Introduction

Authenticating the food supply is challenging because modern food production is more complex and there are increased concerns about food product authenticity, safety and regulatory requirements. The demand expectations of a halal consumer are not only for absence of haram items. Nowadays, consumers demand the halal products to be safe, hygienic and health promoting. Such expectations are illustrated in the concept of *halalan tayyiban* in which it is emphasized that food and beverage should be lawful, wholesome and safe to eat (Mokti et al., 2023). Therefore, food safety should be considered as a part of the halal assurance. Recent studies further suggest that the concept of *tayyiban* should be interpreted more broadly to encompass food safety, nutritional value, consumer protection, and public health (Ali et al., 2023). This is in line with the *Maqasid Syariah* goals such as the protection of life (*hifz al-nafs*) (Alias et al., 2024). Therefore, food safety requirement can be considered as one of the practical applications of *halalan tayyiban* principles.

Halal forensic science has become more relevant as well in the context of the rising importance of the food safety field. Halal forensic studies are traditionally of the detection of forbidden substances, particularly the DNA of the pig as well as species substitution using molecular techniques (Yusop & Bakar, 2020). Comparable methodologies are used in food authentication (Martuscelli et al., 2020), in which food integrity is tested using scientific tools, and adulteration of food supply chains is detected. In recent years, however, food forensic studies have also been extended to include cases involving contamination, violations of food regulations, or scientific investigation of cases of food safety (Saadat et al., 2022). However, the use of forensic science for the assessment of food safety parameters in the framework of halal foods has so far remained rather underestimated. Despite a product being certified with halal ingredients, most studies still focus on the verification of the ingredients, which may not be enough to meet the established safety requirements. In these situations, the scientific evidence will play a role in the enforcement of regulations but also in deciding whether a product is indeed in compliance with the broader definition of *halalan tayyiban*.

The case between *Public Prosecutor and Pek Woei Yi & Malee Mineral Water Sdn. Bhd.* (2022) 1 LNS 1111 is an interesting case. This case was a halal forensic challenge and the reason for investigation was to detect the presence of the sulphate and chloride in bottled mineral water, which is not a prohibited ingredient in halal foods like most other cases, but rather required to be analysed in the laboratory by health authorities. The laboratory results were subsequently used as the basis in the subsequent legal proceedings under the Food Act 1983 and Food Regulations 1985. The case thus provides a chance to discuss how scientific evidence is applied in determining non-compliance with the regulation and implications based on the principal of *halalan tayyiban*. Thus, this paper reviews the forensic dimensions of the case, including the gathering of evidence, laboratory analysis and how the evidence was used in the court case. It also explores how this case relevant to halal assurance and whether or not the scope of halal forensic science should be expanded for food safety compliance, in addition to the detection of prohibited substances.

Facts of the Case

In *Public Prosecutor v Pek Woei Yi & Malee Mineral Water Sdn. Bhd.* (2022) 1 LNS 1111, charges were laid for selling bottled mineral water in non-conformance to requirement prescribed under the Food (Act 1983) and Food Regulations 1985. Bhd., had pleaded guilty to the offenses. The accused, who is the director of Malee Mineral Water Sdn. Bhd., had admitted the offences. Bhd was charged with an offence under Section 13B(1) in conjunction with Section 13B(2)(d) of Food Act 1983 and Subregulation 360A(7) read with Subregulation 2(5) of the Food Regulations 1985.

The evidence presented on the court showed that on 11 April 2018 at about 10.55 a.m, a District Health Officer (DHO) bought three bottles of Malee Mineral Water at 7-Eleven outlet along Jalan Aman, Mambang Diawan, Perak. The bottles were bought as part of an enforcement action to sample and analyze. The samples were accurately labelled and documented after purchasing and then sent to the laboratory for analysis.

The prosecution's expert witness determined that the water samples contained sulphate at 33mg/l and chloride at 13.4mg/l which were not included in the Twenty-Sixth Schedule of the Food Regulations 1985 as permitted mineral content. Consequently, product was deemed to be adulterated food because it contains substances not allowed by the laws in force on the product.

The prosecution's case was that the product was sold as being non-compliant with the specifications required under the food legislation and therefore was an offence. However, the defence argued that sulphate and chloride are natural minerals large amounts of which are present in mineral water widely available for sale. The defence argues that the presence of these minerals alone didn't mean either the product was unsafe or contaminated.

The essential question the court had to answer was whether the presence of sulphate and chloride in the mineral water might be considered as naturally occurring mineral contents or whether it made the mineral water non-compliant with the requirements of the Food Regulations of 1985. On examining the evidence of the witnesses, the laboratory evidence and the provisions of the law, the court found that the prosecution had made out a prima facie case against the accused.

Forensic Analysis

Sample Collection and Handling

One of the most crucial aspects of a food forensic case is the collection of samples, as the reliability of the scientific findings relies heavily on the condition and integrity of the samples collected. District Health Officer (DOH) samples of mineral water were obtained as part of an enforcement action, directly purchased from a retail outlet in this instance. In food forensics it is common practice to obtain products directly from the marketplace as it can mimic the actual product available to consumers and minimize the risk of product manipulation or product contamination after seizure (Saadat et al., 2022).

After the samples were recovered, they were identified and recorded prior to submission for laboratory analysis. While the judgment does not disclose a lot of detail on the process of chain of custody, elsewhere it is considered that documentation and traceability are integral pieces of forensic investigations. Such procedures enable the tracking of evidence and its movement from its point of collection through to laboratory analyses and assist in preservation of evidence presented in court hearings (Santori et al., 2026). Based on the above, the treatment of the samples in the present case have apparently met the basic needs of food forensic practice.

Laboratory Analysis and Scientific Detection

The samples were then analysed using standard chemical techniques to identify mineral ions, especially sulphate and chloride present. According to previous studies these ions can be highly sensitively and accurately measured by techniques like flow injection analysis (FIA) with a single acoustic wave sensor, and they are suitable for the analysis of drinking water samples (Venâncio et al., 2018).

Laboratory analysis of foods can be useful in food forensics for more than just the identification of specific substances. The quantitative data obtained by scientific testing can also be used as an objective basis as to whether a product meets the standards set forth under the food laws. Laboratory analysis is the connection between the physical evidence and the pertinent legal requirements in this context.

Forensic Interpretation of the Laboratory Findings

Laboratory results are crucial in forensic investigations as the scientific results need to be taken into context of the legal and regulatory framework. In the present instance the presence of sulphate and chloride should not be regarded as a natural chemical phenomenon. Instead, these findings need to be assessed in light of the requirements prescribed under the Food Regulations 1985. It has been evidenced from studies that the sulphates and chlorides are present naturally in many mineral and groundwater sources and their levels may vary depending on the geological and environmental conditions (Vaccarezza et al., 2025). Therefore, scientific evidence does not necessitate the view that those minerals are a sign of contamination or product adulteration.

However, food forensic investigations involve not only scientific observations, but regulatory compliance as well. A product can be deemed as non-compliant even if the contaminants present are not a health concern but do not meet legal requirements. Thus, it is clear in this case that the interpretation of scientific evidence in halal forensic as well as food forensic investigation is a blend of scientific assessment and legal interpretation.

Evidential Value of Scientific Findings in Court Proceedings

In many cases involving food safety and regulatory violations, the scientific proof acquired through laboratory analysis can be the determining factor in the case. Food forensic investigations usually involve using chemical and biological analyses to substantiate claims of food fraud and food adulteration, as well as food law violations (Saadat et al., 2022). Laboratory reports will thus provide objective evidence that helps the court reach findings based on scientific facts and not just assumptions.

According to Santori et al. (2026), factors such as the reliability of the analytical methods applied, the competence of the expert witnesses, and the integrity of chain of custody play a significant role in the strength of the forensic evidence in food-related cases. In the instant case, the laboratory results were not just technical but were part of the crucial foundation on which the prosecution was to press their case for the accused's liability. Overall, the case study highlights the versatility of scientific evidence in halal forensic investigations, transcending simply the detection of prohibited ingredients. Further, the assessment of compliance with food safety criteria required by law is included, again demonstrating the wide role of forensic science in linking scientific results with legal and regulatory decisions.

Discussion

Conflict between Scientific Evidence and Regulatory Compliance

The present case is an example of the challenge to reconcile scientific findings and the demands of food law. As is the usual practice in the science of scientific practice, the presence of these substances, such as sulphate and chloride is typically judged based on their levels (concentration) and the potential for them to cause harmful health effects. Both minerals have been found in many natural drinking water sources and are not generally linked to any adverse health effects at relatively low concentrations (Vaccarezza et al., 2025).

However, under the food legislation compliance is judged based on the criteria laid down in the rules and the natural mineral variations within a water source are ignored. This is a classic example that highlights the basic fact that risk-based approach is followed in the science of food, while compliance-based approach is followed in food regulation. It also prompts people to wonder if the regulatory environment is still suitable to deal with the realities of science in the modern food and beverage industry.

Halalan Tayyiban as a Holistic Assessment Framework

Based on the Islamic point of view, the result of this case can support the idea that the meaning of *halalan tayyiban* is not only free from haram or forbidden material, but also contains safety, cleanliness and consumer well-being. According to Mokti et al., (2023), the notion of *tayyiban* is multifaceted and also involves quality, safety and benefit to human being. In the same vein, Ali et al., (2023) state that products which do not adhere to the accepted food safety standards, provided compliance with the halal requirements is present in terms of ingredients, it is insufficient.

Under the framework, failure to meet food safety conditions can also have an impact on the *tayyiban* aspect of a food product. Thus, if the assessment of halal is dissociated from scientific assessment of food safety, both of them will support each other in fulfilling the goals of *Maqasid Syariah*, especially the preservation of human life (*hifz al-nafs*).

Expanding the Scope of Halal Forensic in Food Safety

The traditional approach of halal forensic studies has largely concentrated on the detection of forbidden materials, such as presence of porcine DNA or alcohol in food stuff (Yusop & Bakar, 2020; Martuscelli et al., 2020). There are more specifically issues addressed to the authenticity of ingredients and prevention of food fraud. But recent advancements in the food forensics field suggest that science investigations have been expanded to issues related to food safety, product authenticity, and regulatory compliance (Saadat et al., 2022).

Based on the above case, it can be seen that halal forensic should not only be limited to the detection of forbidden ingredients. It should also involve the evaluation of food safety factors, including mineral nutrient, chemical contamination and other factors that could have impact on the consumer's health. A product can meet the ingredients and source requirements for halal but might not meet recognised safety standards and this can be a violation of the concept of *tayyiban*. Therefore, halal forensic can be known as a multidisciplinary issue that involve Shariah, scientific assessment and regulatory compliance in the food product evaluation.

Implications for the Halal Certification System and Food Governance

This situation is also significant from the perspective of the actors of the halal certification system in Malaysia. In addition, there are existing standards, such as MS1500 and the Halal Assurance System (HAS), which has a high level of emphasis on ingredient control, production procedures, as well as cross-contamination prevention (Razaly & Zakaria, 2018; Sari et al., 2021). These are all components that are undeniably significant. But scientific security evaluations especially chemical analysis and security evaluation are still not very visible in current halal auditing practice.

Thus, the case at hand suggests that there may be a shortcoming in the current certification process. If the purpose of halal certification is not only to ensure that food is halal but also safe and wholesome, then more focus should be put on scientific parameters which could have an impact on the safety of the product. The greater incorporation of laboratory-based assessments report in the process of halal auditing could solidify the trust of public on halal certification and give a more in-depth view on *halalan tayyiban*. To achieve this goal, halal authorities, food safety agencies and scientific institutes should have more cooperation. Some improvement is needed in coordination at various aspects including laboratory testing and enforcement procedures and data sharing, to have a more informed certification system, which is in line with Sharia values.

Recommendations

Based on the issues that can be discerned from this case, several measures can be considered. Firstly, the scientific safety assessment should be made a more systematic way to be incorporated in halal auditing processes. Alongside the current process verifications and document reviews, laboratory testing to detect chemical contaminants and mineral components may be used to further support the scientific basis for halal assurance.

Secondly, increasing collaboration between the halal regulating and food safety authorities should be encouraged. The exchange of laboratory results, analytical techniques and enforcement data would help to diminish regulatory fragmentation and strengthen their decision-making. The scope of halal forensic should be developed with the advancement of food forensic science. In addition to identifying ingredients that are prohibited, a halal forensic examination should also focus on food safety, product quality and public health issues that could impact on the *tayyiban* status of a product.

Finally, the development of a more comprehensive halal forensic framework is needed, especially in the event of regulatory non-conformance, with further research required. In the future, research may be conducted to find a way to combine scientific research results with Shariah assessment so that the issuance of halal certification is based on scientific facts and shariah.

Conclusion

Overall, the present study has shown that forensic analysis can be significant in bridging science and food law, and in the overall aim of *halalan tayyiban*. The *Public Prosecutor v Pek Woei Yi & Malee Mineral Water Sdn. Bhd.* is a recent civil case. Evidence from the laboratory can not only be used in court but is also a valuable tool in evidence to establish whether a product meets recognised food safety standards such as illustrated in (2022) 1 LNS 1111. The case also demonstrates the importance of using the forensic sciences in a food investigation to identify more than just banned substances. The scientific assessment can also assist in assessment of product safety and quality which are now known as important factors of halal assurance.

In a wider meaning of halal, as in *halalan tayyiban*, the compliance with halal is related to safety, cleanliness, and consumer well-being. For this reason, there is a need to draw better linkages between forensic science, food regulating bodies and Shariah principles if the halal certification is about to retain its credibility and significance. Finally, it is recommended that the cooperation of halal institution and food safety authority along with an extension of scope halal forensic can assist in the formation of a more complete and evidence-based halal assurance system so that it is more in line with the goal of *Maqasid Syariah*.

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