

Weighing the Risk: A Qualitative Inquiry into the Effectiveness of Halal Logistics Implementation in Fresh Grocery Retailing

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Abstract: As the global halal food market exceeds \$2.7 trillion by 2024 and grows at a compound annual rate of more than 9% over the next decade, attention has increased on logistics processes that maintain halal integrity from farm to fork. Most extant halal logistics literature has focused on manufacturing, warehousing, and cross-border transportation, with little empirical attention to receipt and handling operations in grocery retail, where integrity is arguably most at risk (i.e., fresh grocery retail outlets). This study is filling in this gap by determining the impact of halal logistics implementation from three operational factors (equipment, segregation, and packaging) on food quality to support fresh groceries at a select grocery retail outlet in Malaysia. An exploratory qualitative case study design was used, where data from in-depth interviews with four purposively selected employees (2 from the Halal department and 2 from the Receiving department) and the transcribed text were analysed using NVivo. The results demonstrate that while segregation of entry points and other locations, as well as sealed packing practices, were fairly well implemented, shared use of weighing equipment between halal and non-halal fresh meat was identified as the greatest risk, which maintains a continual cross-contamination hazard that is only partially alleviated by disposable liners and consumer transport carts. The informants agreed on practical solutions, such as dedicated and clearly marked weight scales, protective covering for shared equipment, and regular sertu cleaning efforts. It expands the equipment-segregation-packaging framework to a retail receiving-dock context and provides concrete, low-cost elements for management and policymakers that can improve halal integrity assurance at the retail touchpoint with Muslim consumers.

Keywords: *Halal logistics; Halal supply chain integrity; Fresh groceries; Cross-contamination; Retail operations; Qualitative case study*

1. Introduction and Background

Halal, an Arabic word for "permissible, lawful" in Islam, has transcended beyond a religious designation to become an international indicator of food quality, hygiene, and safety (Tieman, 2011). The global halal food market was estimated at USD 2.7 trillion in 2024, with supermarkets and hypermarkets holding the largest distribution share, and industry undertakings expect expansion towards USD 5-6 trillion by the early 2030s (Research and Markets, 2025; Statista, 2024). This growth is driven by population growth, increased consumer awareness of halal products and their quality, safety, and ethical attributes, as well as greater harmonisation between different certification systems among producing and consuming regions (Akbar et al., 2023). This also means that Asia Pacific attracts nearly half of the global revenue, with Muslim countries such as Malaysia and Indonesia driving production and consumption. This growth is now not exclusive to Muslim consumers; in fact, halal has slowly but steadily gained traction with non-Muslim shoppers as an informal substitute for hygiene, ethical sourcing, and quality assurance, a trend which has pulled mainstream grocery retailers into the halal supply chain regardless of whether or not halal compliance was ever core to their business model.

Malaysia is a country in which Muslims form the majority of the population and has set itself as an aspiring global halal hub with the Department of Islamic Development Malaysia (JAKIM) regulatory authority, international standards MS1500 & standard food processing machinery MS2400. However, the basis of any

halal claim is not solely based on any certification but relies upon the procedural integrity of every downstream handling step, as a naturally halal product becomes unhalal once it comes into direct contact or processing with najis (filth/impurities). The role of retailers within this chain is especially precarious. However, a multi-category grocery outlet is not like manufacturing plants, which can be designed around dedicated halal production lines; in fact, fresh halal and non-halal raw meat literally cross paths every day as they are regularly received, weighed, and displayed side by side within the same retail space footprint, often employing the same receiving equipment and creating repetitive opportunities for oversight and cross-contamination to occur even though these products already have halal certification from their suppliers.

The problem addressed in this study emerged from direct observation of a grocery retail outlet's receiving department, where halal and non-halal fresh meat, including pork, is weighed using the same weighing scale. Although the outlet has introduced mitigating measures, a flattened box and a yellow container placed beneath non-halal items to catch drips and residue, these measures depend on consistent staff compliance and do not eliminate the underlying source of risk, which is the equipment itself. Because chilled meat has a short shelf life and must be received frequently in small batches, the opportunity for contact between halal and non-halal meat on shared equipment recurs many times each week, compounding the cumulative risk to halal integrity even where each incident appears minor.

Guided by this problem, the study pursues three objectives: to measure the effectiveness of halal logistics implementation in fresh groceries retailing, to identify which of three commonly cited determinants, equipment, segregation, and packaging, is most critical to that effectiveness in a real retail setting, and to generate practical recommendations for enhancing halal logistics implementation at the retail receiving interface. These objectives respond to three corresponding research questions concerning the factors that shape effectiveness, the relative criticality of each factor, and the improvements that practitioners themselves regard as feasible. The study is significant to several audiences: Muslim consumers who rely on the retail environment to preserve the halal status of what they purchase, suppliers and retail managers who must translate certification into operational practice, policymakers responsible for halal standards enforcement, and researchers seeking empirical grounding for the equipment-segregation-packaging framework beyond the manufacturing and transportation contexts in which it has predominantly been studied.

2. Literature Review

Halal must be taken in tandem with tayyib, wholesomeness, to define not just what Muslims can or cannot ingest but the level of cleanliness, safety, and ethical treatment that a product must receive from farm to fork. Current halal logistics literature still views this dual requirement as the conceptual anchor of the discipline, namely that a product is not halal because its ingredient components are halal but rather only so long as the entire pedigree of the chain of custody, procurement, processing, storage during gap analysis and analysis to produce points, clean transport custody, or retail conducting has been complete without contamination by najis or with contact with non-halal substances (Haleem et al., 2021; Handayani et al., 2021). This broader articulation of halal, from an ingredient-specific characteristic into a cross-supply-chain assurance, is what transforms halal logistics from merely a compliance obligation to its own substantive area of operations management research.

In the literature, Halal logistics has been defined as an extension of conventional logistics principles, whereby products and processes that need to conform with Shariah must be planned, implemented, and controlled at every node of the chain (Haleem et al. In previous systematic reviews, halal supply chain management has been summarised as including the additional components of certification, traceability, segregation and dedicated logistics assets; whereby these additional requirements increase operational complexity and cost with respect to conventional supply chains, thereby explaining why even when firms have certified their core products they only partially implement halal logistics principles - especially true for small/medium enterprises operating in mixed halal/non-halal markets (Kurniawati & Cakravastia, 2023; Rizki et al., 2023). This gap between certification and full logistical compliance is exactly the space in which contamination risk builds up, and it is this terrain that this study examines at the single retail outlet level.

Contamination in halal supply chains has been shown to originate from multiple sources: shared transport and

storage infrastructure, inadequate cleaning between handling cycles, human error at warehousing and retailing points, and, increasingly, fraudulent or unverifiable certification claims that mask non-compliant practices further upstream (Hasnan & Kohda, 2023). Because the majority of contamination pathways described in the literature are physical rather than chemical, most mitigation strategies converge on three practical levers: the equipment used to handle products, the physical segregation of halal from non-halal items, and the packaging that shields products from contact and leakage. These three levers correspond closely to the determinants examined in this study and are discussed in turn below.

Equipment is repeatedly identified as a primary vector of cross-contamination because tools such as knives, grinders, containers, and weighing scales come into direct physical contact with meat and other perishable products. Guidance from halal certification bodies stresses that equipment used for halal products must be free from contact with non-halal substances and, where contamination does occur, must undergo religiously prescribed cleansing, commonly referred to as *sertu*, before it can be reused for halal purposes (Halal Foundation, 2025). Industry analyses of cross-contamination risk likewise identify shared storage units, freezers, and handling tools as the most common and preventable source of halal integrity breaches, particularly in mixed retail environments where halal and non-halal items are processed within the same physical space rather than in dedicated, single-purpose facilities (ISA Halal, 2025). Recent supply chain risk studies extend this concern to processing and cosmetic manufacturing contexts as well, noting that ingredient scarcity and reliance on shared repackaging suppliers can reintroduce contamination risk even after a product has initially been certified halal (Mohd Ashmir Wong et al., 2023).

Segregation, the physical separation of halal from non-halal products throughout handling, storage, and display, is widely regarded in the literature as the most fundamental safeguard of halal status, precisely because it removes the opportunity for contact rather than relying on cleaning after the fact. Studies of halal supply chain integrity note that the required intensity of segregation varies by context; fully halal-dedicated facilities can achieve complete separation, whereas mixed retail environments serving both Muslim and non-Muslim customers must instead rely on layered controls such as separate entrances, dedicated storage zones, and colour-coded or labelled equipment to approximate the same protective effect (Handayani et al., 2021; Rajendran et al., 2024). Where segregation is only partial, as is common in international retail chains that sell both halal and non-halal meat under one roof, the burden of preserving halal integrity shifts toward the remaining two levers, equipment and packaging, making their proper implementation correspondingly more important.

Packaging serves three interlocking functions in halal logistics: it protects products from physical damage during transport and handling, it prevents cross-contact between halal and non-halal substances when full segregation is not feasible, and it communicates halal status to the end consumer through certification marks and labelling (Khoirunnisa et al., 2024). Where packaging is compromised, for example through torn vacuum seals or leaking blood from improperly wrapped non-halal meat, the risk of cross-contamination escalates sharply because the packaging can no longer function as a barrier. Contemporary halal integrity guidance therefore treats robust, intact packaging as a necessary complement to, rather than a substitute for, physical segregation and dedicated equipment (Halal Foundation, 2025). Taken together, these three literatures on equipment, segregation, and packaging converge on a single insight that motivates the present study: halal integrity at the retail level is rarely undermined by a single catastrophic failure, but rather by the cumulative, everyday friction of shared tools, incomplete separation, and imperfect packaging operating simultaneously within a single receiving department.

3. Research Methodology

The qualitative case study design was suitable as an exploratory inquiry into a contemporary and operational phenomenon with uncertain boundaries (halal logistics implementation, in the context of an operating multi-category grocery retail outlet). The qualitative case designs in the halal supply chain literature have been used effectively in other areas to obtain insights about the operational realities that survey-based quantitative studies bring an abstraction to, such as recent work on blockchain adoption in Malaysian halal micro, small and medium enterprises leveraging detailed interviews with practitioners to elicit practical implementation enablers and challenges (Hassam et al., 2025), or similar qualitative interview-based works that have sought

understandings of halal traceability from different lenses of policymaker and producer perspectives. In this tradition, the present study observes superior proximity to hands-on operational expertise from frontline employees over aggregated as-is survey data.

This study takes place in one grocery retail outlet in Malaysia, which sells halal and non-halal fresh meat at the same location, out of a total operational workforce of forty-eight employees ranging from store management, receiving, food and grocery, chilled & frozen goods, fresh market, cashiering, as well as the Halal and Non-Halal departments. Since the phenomenon that is the subject of this research deals with the implementation of halal logistics, which is restricted to processes directly at and between the Halal department and Receiving department, this study focused its substantive interest on employees who are employed in these two departments, as employees from both departments collectively have direct operational knowledge regarding how halal fresh meat and non-halal fresh meat are received, weighed, and handled.

A purposive sampling technique was employed to select four respondents: two employees from the Halal department and two employees from the Receiving department, each with at least one year of relevant working experience. Purposive sampling was considered appropriate given the small, specialised population and the qualitative, depth-oriented nature of the inquiry, in which information power rather than statistical representativeness determines an adequate sample; a small number of information-rich informants who deal with the phenomenon daily was judged more valuable than a larger but less experientially grounded sample.

Primary data were collected through structured interview sessions comprising six questions addressing the parties responsible for halal compliance, the existing policies and process flows governing halal fresh groceries, the training and experience expected of halal supervisory staff, the relative criticality of equipment, segregation, and packaging, any residual issues in the two factors not nominated as most critical, and each respondent's own recommendations for improvement. Each interview lasted approximately thirty minutes and was conducted at the receiving department of the outlet, allowing respondents to refer directly to the physical equipment and layout under discussion.

Interview transcripts were analysed using NVivo, a qualitative data analysis software package designed to help researchers organise, code, and identify patterns within unstructured textual data such as interview transcripts (Lumivvero, 2023). Responses were coded against the three research objectives and the three independent determinants, equipment, segregation, and packaging, allowing convergent and divergent themes across the four respondents to be systematically compared. This thematic, software-assisted approach is consistent with recent qualitative halal supply chain research, which has similarly used structured coding of interview data to distil practical themes from operational narratives (Hassam et al., 2025).

4. Results

For the first objective, which is to examine how the effectiveness of halal logistics implementation is measured, respondents agree that three parties represent halal compliance for fresh groceries: at least the supervisor in a Halal department, the buyer, and the supplier. Suppliers are responsible for halal certification of meat and for compliance in the upstream slaughtering and processing chain; buyers are responsible for selecting and ordering halal stock appropriately; on-site supervisors are responsible for verifying incoming meat via purchase order (PO) verification and monitoring up-to-date halal status throughout day-to-day handling. Additionally, a respondent stressed that the supervisor role should be occupied by a Muslim employee, reflecting the view that religious know-how, rather than technical training alone, is a prerequisite for sound supervision. Taken together, these accounts suggest that halal logistics implementation at the outlet is structurally present, with roles and a chain of accountability, but its effectiveness in practice depends on how thoroughly those roles are executed at the physical receiving point, where our subsequent findings identify the least resilience and greatest vulnerability.

On the second objective, all four respondents identified the equipment, specifically the weighing scale used to receive incoming meat, as the number one priority among all three determinants that reduce halal logistics effectiveness. Although the receiving department had two chosen scales, respondents described a common practice of using both interchangeably for halal and non-zabiha meat, with the only barrier to direct contact

being a flat box or yellow container placed on top of the non-zabiha side. Multiple respondents expressed discomfort with this: one was uncertain whether the distribution centre itself separates casings for inter-branch transfer of non-halal stock, while another Muslim employee explicitly reported feeling uncomfortable that scales are not product type-specific. In contrast, survey participants stated that other equipment such as knives and grinders are adequately segregated between the Halal and Non-Halal departments, which highlights the weighing scales as an outlier practice rather than a systemic issue across all equipment categories.

On the last two determinants of segregation and packaging, respondents generally described these areas as relatively well managed but not without some lingering concern. Physical separation was described by the respondents operating at the level of department location and delivery entrance, with the Halal and Non-Halal departments physically far apart from each other and utilising distinct receiving points, which was perceived as a significant, albeit incomplete, protection. In terms of packaging, halal meat was also reported as sufficiently packaged in that it usually arrives vacuum-packed or wrapped properly, whilst respondents made the point that non-halal meats such as pork can arrive unquantified and either incorrectly packed or loosely shrink-wrapped, and so if any packaging issues are flagged upon arrival then strict measures via the return process implemented through the respective receiving department prevent the offending meat from setting foot on the shop floor. These accounts show segregation and packaging are sufficient secondary controls, but their sufficiency is precisely what makes the shared-equipment problem so saliently the binding constraint on aggregate performance.

Across the third objective, which is generating recommendations, respondents suggested a suite of solutions that are complementary and mutually reinforcing rather than one single solution. One suggestion frequently put forward was to have one of the two existing scales be specifically assigned for non-halal goods, and physically relocated to the Non-Halal department to alleviate receiving staff having to carry the same set of scales between departments each time a package from a non-halal supplier arrives. Another related suggestion was to cover the common scales with plastic sheets that are thrown away after use, so that blood or fluids from non-halal meat do not touch the part where halal products are weighed; this was also perceived by respondents as a temporary low-cost measure in preparation for a complete separation. Another respondent also added that investment in packaging should be seen as a complementary safeguard for an international retailer not serving Muslim consumers primarily rather than just secondarily, as segregating trolleys and transport carriers is expensive. Some respondents were frank that complete segregation would take time to establish, given that the outlet was part of a global retail chain with an extensive product range which was not solely halal – implying that recommendations were made with knowledge of organisational realities and as practical suggestions rather than abstractly idealistic proposals.

Discussion

This study's results corroborate and expand on prior explorations in the wider halal supply chain literature that have identified shared equipment as a key driver of cross-contamination (Halal Foundation, 2025; ISA Halal, 2025; Mohd Ashmir Wong et al., 2023). In fact, what is especially novel about the case at hand is the failure point specificity, as much of the existing literature tends to examine either an entire production line or transport fleet, whereas this paper looks at one piece of receiving equipment (the weighing scale) going wrong on its first physical handling step within a retail outlet. But this granularity is important because it proves that halal integrity can be marred by a single unaddressed touchpoint even when near 100 per cent of the rest of the chain, supplier certification, packaging, departmental segregation, etc., was working as intended. It is apparent from these observations that the outlet uses a disposable liner or container, which can be seen as a second-best substitute for dedicated equipment (which is less expensive to install), a common theme found in the larger literature where firms in mixed halal and non-halal markets often implement lower-cost partial mitigations rather than full structural separation stipulated by halal standards because there are capital costs and space costs that can be hard to justify for one product line of businesses when it only needs the entire business halal-certified (Kurniawati & Cakravastia, 2023; Rizki et al., 2023).

Thus, it is also worth interpreting this case as the relatively favourable assessment of segregation and packaging. The implication that those two determinants are unimportant is misleading, because their adequacy should have been a necessary pre-condition for the equipment problem to rise to visibility as a binding constraint; had there also been deficiencies in segregation or packaging, the study would arguably have noted

a compounded multi-factor failure rather than a single dominant one. This fits broadly with the layered-control logic from segregation literature that has described dedicated entrances, storage zones and labelling as complementary safeguards that do not substitute where weakness in any one (in our case at least equipment) undermines the protective value of those barriers that remain intact (Handayani et al. 2021, Rajendran et al. 2014).

The respondents' own assessment that allocating and renaming existing equipment is more convenient than reconfiguring full supply routes or trolley fleets also resonates with past halal technology adoption studies, which suggest small, resource-limited operators tend to prefer sequential low-capital interventions (i.e., labelling, colour-coding and targeted cleaning protocols) while large digital/infrastructural investments such as blockchain traceability remain more characteristic of larger firms or those engaged in export-oriented, fully halal-dedicated chains (Hassam et al., 2025; Tan et al., 2022). This implies that the proper policy and management response to these kinds of findings has to be tailored towards the scale plus business model of the retailer concerned, rather than presuming that solutions which may have proved helpful in halal manufacturing or maybe logistics-provider contexts can certainly transfer directly into a mixed-format grocery store format.

Lastly, the fact that a Muslim worker was manifestly uncomfortable sharing equipment between product types despite formal certification and management-approved mitigations speaks to arguments made in the wider literature (Hasnan & Kohda, 2023) which contend that halal compliance is judged not only by clients but also by workers themselves based on observable on-the-ground handling practices rather than certifications alone. It also highlights that the effectiveness of halal logistics cannot be merely a documentation or audit exercise; it is constantly re-enacted, or subverted, at the level of operations by what staff do with specific tools, spaces, and materials used in their day-to-day work.

5. Managerial Implications and Recommendations

The intervention indicated in the current study for retail management that would most immediately be available and at low cost is the physical separation of this weighing option by simply moving and dedicating an existing second weighing scale to non-halal single-use products, clearly labelled with a permanent, clear label on/near it to differentiate it from the halal-designated scale. As both scales are already owned by the outlet, this recommendation solves the cost issues mentioned above by utilising existing resources, rather than new capital expenditure as in (i), which is one of the reasons for respondents' preference for full segregation of trolleys and transport equipment. Where immediate relocation is impractical due to space constraints at the receiving dock, management can also facilitate/protective plastic cover for the shared scale as a transitional measure, with a full understanding that this would minimise but not completely eliminate contact and thus needs to be treated as an interim rather than long-term solution.

These findings, in addition to equipment considerations, also reinforce the importance of having a dedicated Shariah advisor at the outlet or regional level in accordance with Malaysian standard MS2400 principles that promote a halalan-toyyiban management system whereby an endorsed Shariah reference point assists staff on how to handle and resolve ambiguities when determining whether purified-outsourced contaminated equipment needs to undergo religious purification before reuse. Perhaps management should focus on recruiting and training Muslim supervisory personnel in the Halal department because respondents connected a direct link between supervisory religious literacy and effective day-to-day compliance judgment calls; this connection was also noted in previous halal workforce research where trained professionals were found to be deciding factors around functional halal handling.

On the ground, the outlet must establish a routine sertu decontamination process for anything known to have been contaminated or reasonably suspected of being so with serious najis, such as creating an auditable procedure from what seems now to be an ad-hoc brick and liner-based mitigation. Such would not merely mitigate contamination risk; it would also provide an added reason for internal compliance audits, which could document adherence to halal conditions and provide due diligence evidence during actual halal certification audits, and they also reinforce client confidence in the integrity of outlets with Muslim consumers who are demanding visible, verifiable proof of handling over simply relying on publicity certifications.

At a broader industry and policy level, this study suggests that halal certification bodies and retail trade associations should consider issuing receiving-dock-specific guidance, distinct from manufacturing-oriented halal standards, that addresses the particular equipment-sharing risks inherent in mixed-format grocery retail, where a single outlet legitimately carries both halal and non-halal product lines. Larger retail chains with the resources to do so might also explore lower-cost digital traceability tools, building on emerging halal blockchain and QR-based verification research, to log equipment cleansing and handling events, though this study's findings suggest such investments should be sequenced after, rather than instead of, the more fundamental physical separation of shared equipment (Tan et al., 2022; Hassam et al., 2025).

Conclusion

This study set out to measure the effectiveness of halal logistics implementation in the fresh groceries department of a Malaysian grocery retail outlet, to identify which of three commonly cited determinants, equipment, segregation, and packaging, most critically shapes that effectiveness, and to generate practical recommendations grounded in the perspectives of employees who manage this process daily. All three objectives were achieved. The evidence indicates that the outlet's halal logistics implementation is only partially effective: segregation of departments and entry points, together with generally adequate packaging, provide a reasonable foundation, but the continued shared use of weighing equipment between halal and non-halal fresh meat represents a persistent and, by the respondents' own account, avoidable source of cross-contamination risk. Equipment, rather than segregation or packaging, emerged unambiguously as the most critical determinant in this case, and respondents offered specific, low-cost, and organisationally feasible recommendations: dedicated and labelled scales, protective covering as an interim measure, and periodic sertificate cleansing that management could plausibly implement without extensive capital investment.

A number of limitations to the study should temper the generalisability of its conclusions. Data collection was also restricted by the host organisation's confidentiality requirements to interview accounts from four respondents at one outlet and did not permit direct observation of company documentation or triangulation across multiple retail sites. This was a qualitative case study, and data were analysed rather than statistically generalisable; the configuration of equipment described here (two weighing scales across product types) is not necessarily transferable between grocery formats or markets. A quantitative, multi-outlet design that can verify whether equipment sharing remains the primary risk factor across a larger and more heterogeneous sample of retail contexts would be useful for future research; as well, it should be possible to extend this line of inquiry to test whether emerging digital traceability and blockchain-based verification tools could be operationalised in lower-cost forms for mixed-format grocery retail (as opposed to being applicable only in dedicated halal manufacturing/ export logistics contexts). Despite these caveats, the study provides an empirically derived and practitioner-informed story of where halal integrity currently rests least robustly at the retail interface and thus serves as an actionable basis for participation from retailers, certifiers and researchers alike who are keen to bridge the practice gap between halal certification and logistics-type practices.

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