

Operational Efficiency and Waste Reduction in Halal Food Production: A Systematic Literature Review from an Islamic Operations Management Perspective

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ABSTRACT

The growing halal food industry faces the dual operational challenge of improving production efficiency while minimizing resource waste without compromising halal integrity. Although previous studies have addressed halal production, operational efficiency, waste reduction, sustainability, and Islamic economic principles, these research streams remain fragmented, particularly at the production-operations level. This study systematically reviews the literature on operational efficiency and waste reduction in halal food production and examines their integration through an Islamic Operations Management (IOM) perspective. Following the PRISMA 2020 guidelines, publications indexed in Dimensions from 2014 to September 2026 were identified using four complementary search sets. The search yielded 86 records; after removing 12 duplicates, 74 records were screened, 33 reports were sought for retrieval, 31 were assessed for eligibility, and 10 studies were included in the final qualitative synthesis. The findings indicate that operational efficiency is multidimensional, encompassing process efficiency, productivity, cost, capacity, yield, resource utilization, and sustainable performance. Waste-reduction practices follow a progressive pathway of prevent/avoid, reduce, recover/recycle, and valorise, while halal integrity establishes operational boundaries for these improvements. A key conceptual finding is that operational waste and *israf* are related but not equivalent: operational waste represents technically measurable inefficiency, whereas *israf* provides a normative criterion for evaluating excessive or inappropriate resource utilization; their intersection lies in responsible resource use. Based on the cross-study synthesis, this review proposes the Islamic Sustainable Halal Operations Framework (ISHOF), integrating Islamic normative foundations, halal-tayyib operational governance, production operations, operational efficiency and waste minimization, and sustainable performance and *maslahah*-oriented outcomes. ISHOF positions Islamic principles as normative guidance for the objectives and boundaries of operational improvement rather than as substitutes for established operations-management tools. The framework provides a conceptual foundation for future empirical research on efficient, low-waste, and responsible halal food production.

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1. INTRODUCTION

Halal food production is increasingly discussed not only as a matter of product permissibility and certification but also as an operational challenge involving process design, resource use, quality, integrity, and sustainability. Production systems must preserve halal integrity while simultaneously responding to conventional managerial pressures for higher productivity, lower cost, shorter lead time, improved yield, and more responsible resource utilization. Lean-oriented halal research has already shown that operational improvement and halal integrity can interact directly within food-processing systems rather than representing separate managerial agendas (Ali et al., 2017).

Operational efficiency is particularly relevant because halal production depends on the coordinated transformation of materials, labor, energy, water, equipment capacity, and processing time into conforming outputs. Evidence from sustainable halal-related production settings shows that performance can be evaluated through multiple dimensions, including manufacturing cost, productivity, capacity, yield, process efficiency, and resource use (Hidayati et al., 2021; Maulana et al., 2026). Efficiency in this context should therefore not be reduced to cost minimization alone, especially when operational controls are required to protect halal integrity.

Waste represents a closely related challenge. In operations management, waste may include non-value-added activities, waiting, unnecessary movement, overprocessing, defects, overproduction, and other forms of resource loss. In halal food systems, the problem also includes physical food and processing residues, slaughterhouse waste, unused by-products, and resource streams that may be recovered or valorised (Sulaiman et al., 2014; Sulaiman, 2023; Sulaiman, 2026). These concerns connect process improvement with environmental performance and resource productivity.

An Islamic perspective introduces an additional normative dimension. The avoidance of *isrāf*, together with *halal-tayyib*, *maslahah*, and *maqāṣid al-sharīʿah*, raises questions not only about whether production is technically efficient but also whether resource use is necessary, proportionate, and responsible. Recent conceptual work has connected Shariah-oriented efficiency with optimal resource use and broader welfare objectives, while circular halal production research has linked waste minimization and resource efficiency with *halalan tayyiban* and *maqāṣid*-oriented principles (Surasana et al., 2026; Septiani et al., 2026). Nevertheless, operational waste and *isrāf* should not be assumed to be equivalent concepts.

The current literature remains fragmented. Lean and production studies tend to emphasize process performance and measurable waste; halal management studies emphasize assurance, integrity, and compliance; sustainability studies focus on environmental performance, waste recovery, and circular resource use; and Islamic economic studies introduce normative concepts such as *isrāf*, *maslahah*, and *maqāṣid al-sharīʿah*. These streams provide important insights, but their integration at the internal production-operations level remains limited.

This fragmentation also creates a level-of-analysis problem. Much halal research adopts supply-chain, certification, consumer, or market perspectives, whereas the production system itself is where materials are transformed, operational losses arise, halal-critical controls are implemented, and measurable efficiency improvements occur. A production-operations perspective can therefore clarify how process efficiency, productivity, capacity, yield, resource use, waste prevention, recovery, and halal integrity interact within a common analytical domain.

Accordingly, this review focuses on the intersection of operational efficiency and waste reduction in halal food production through an Islamic Operations Management perspective. It does not position circular economy as the sole organizing principle, nor does it replace established operations-management methods

with Islamic terminology. Instead, it examines how technical operational mechanisms can be interpreted within halal-tayyib requirements and Islamic normative guidance.

The study aims to systematically identify, evaluate, and synthesize the relevant literature; clarify the dimensions and indicators used to examine operational efficiency; classify waste types and waste-minimization approaches; examine the integration of Islamic normative principles with operational improvement; and identify research gaps that can support an integrative conceptual framework for efficient, low-waste, and responsible halal food production.

2. THEORETICAL FRAMEWORK AND HYPOTHESIS

Building on the research gap identified in the preceding section, this systematic literature review examines how operational efficiency and waste reduction have been addressed within halal food production and how these operational dimensions can be interpreted through an Islamic Operations Management (IOM) perspective. To provide a systematic structure for the review and subsequent synthesis, the study is guided by the following five research questions:

RQ1. How has the literature on operational efficiency and waste reduction in halal food production developed, and what are its main characteristics?

RQ2. What dimensions, practices, and indicators have been used to examine operational efficiency in halal food production?

RQ3. What types of waste have been identified in halal food production, and what approaches have been used to reduce or manage them?

RQ4. How are Islamic Operations Management principles-particularly halal-tayyib, the avoidance of *isrāf*, *maslahah*, and *maqāṣid al-sharīʿah*-integrated with operational efficiency and waste reduction in halal food production?

RQ5. What research gaps emerge from the existing literature, and how can an integrative conceptual framework be developed to support efficient, low-waste, and responsible halal food production?

RQ1 addresses the development and characteristics of the evidence base; RQ2 focuses on operational efficiency; RQ3 examines waste and its management; RQ4 addresses Islamic normative integration; and RQ5 guides the cross-study synthesis and identification of research gaps.

3. METHOD

Research Design

This study employed a systematic literature review (SLR) to identify, evaluate, and synthesize research relevant to operational efficiency, waste reduction, halal food production, and Islamic normative principles. The review was designed and reported with reference to PRISMA 2020, which provides updated guidance for transparent reporting of systematic reviews (Page et al., 2021). Because the included studies were heterogeneous in design, context, and outcome measures, the review used qualitative thematic and content-based synthesis rather than meta-analysis. The analytical structure was organized around RQ1–RQ5, and the conceptual framework was derived from the synthesis rather than imposed as a predetermined model.

Database and Search Strategy

Dimensions was used as the bibliographic database. Searches were conducted in the Title and Abstract fields and limited to publications classified as Article. The review covered publications from 2014 to 2026, with records outside the predefined publication period excluded during eligibility screening. Four complementary search sets were used because the topic spans operations management, halal production, waste management, sustainability, and Islamic normative concepts.

- S1:** ("halal food" OR "halal food production" OR "halal production" OR "halal manufacturing" OR "halal food industry" OR "halal processing") AND ("operational efficiency" OR "production efficiency" OR "process efficiency" OR "resource efficiency" OR "energy efficiency" OR "material efficiency" OR "water efficiency" OR productivity OR "process performance") AND ("waste reduction" OR "waste minimization" OR "waste elimination" OR "food waste" OR "food loss" OR "material waste" OR "resource waste" OR "lean production" OR "lean manufacturing" OR "lean management" OR "value stream mapping")
- S2:** ("halal food" OR "halal food production" OR "halal production" OR "halal manufacturing" OR "halal food industry" OR "halal processing") AND ("waste reduction" OR "waste minimization" OR "waste elimination" OR "food loss" OR "material waste" OR "resource waste" OR "food waste" OR "lean production" OR "lean manufacturing" OR "lean management" OR "value stream mapping")
- S3:** ("halal food" OR "halal food production" OR "halal production" OR "halal manufacturing" OR "halal food industry" OR "halal processing") AND (israf OR israaf OR "halal tayyib" OR "halalan tayyiban" OR masalah OR maqasid OR "maqasid al-shariah" OR "Islamic operations management" OR "Islamic production management")
- S4:** ("halal food" OR "halal food production" OR "halal manufacturing" OR "halal production" OR "food production") AND (israf OR israaf OR "halal tayyib" OR "halalan tayyiban" OR masalah OR maqasid OR "maqasid al-shariah" OR "Islamic operations management" OR "Islamic production management") AND ("operational efficiency" OR "production efficiency" OR "resource efficiency" OR "process efficiency" OR "waste reduction" OR "waste minimization" OR "food loss" OR "material waste" OR "resource optimization" OR productivity OR "lean production" OR "lean manufacturing").

The final searches were conducted in Dimensions on September 18, 2026. The four complementary search sets generated 86 records prior to deduplication. As shown in Table 1, S3 produced the largest number of records ($n = 62$), followed by S2 ($n = 17$), S1 ($n = 4$), and S4 ($n = 3$). Full records were exported in XLSX format. Overlap among search sets was expected and handled during deduplication.

Table 1. Summary of Literature Search Results from the Dimensions Database

Search set	Records exported
S1	4
S2	17
S3	62
S4	3
Total before deduplication	86

Eligibility Criteria

Eligibility was determined across five domains: production context, operational phenomenon, Islamic normative relevance, publication characteristics, and evidence availability. Studies were eligible when they addressed halal food production or related operational systems and examined operational efficiency, productivity, process/resource efficiency, lean practices, waste reduction, valorisation, sustainable production, production control, or relevant Islamic concepts. Studies focusing on consumer behavior, purchase intention, tourism, generic Islamic economics, certification law, or supply-chain issues without a direct production link were excluded. Only Articles published from 2014 to 2026 were retained. Uncertain records were retained for full-text assessment, whereas unretrieved reports were documented separately.

Eligibility criteria were applied consistently, emphasizing direct relevance to production operations. The inclusion and exclusion criteria are summarized in Table 2.

Table 2. Eligibility Criteria for Study Inclusion and Exclusion

Criterion	Include	Exclude
Context	Halal food production, processing, manufacturing, slaughtering, food-service production, or directly related operational systems	Consumer-only, tourism/destination, or unrelated sectors
Operational phenomenon	Efficiency, productivity, lean/process improvement, resource efficiency, waste/loss reduction, valorisation, sustainable production	No meaningful production-operations relevance
Islamic dimension	Halal-tayyib, israf, maslahah, maqasid, or Islamic ethics directly linked to operations	Generic Islamic economics or certification law only
Publication	Article; 2014–2026	Other publication types or outside period
Evidence availability	Retrievable report for final eligibility assessment	Report not retrieved: documented separately and not used as evidence

Study Selection

The study-selection process followed identification, screening, retrieval, eligibility assessment, and inclusion in accordance with PRISMA 2020 (Page et al., 2021). The four search sets yielded 86 records. After removal of 12 duplicates, 74 unique records remained for title and abstract screening. Forty-one records were excluded, leaving 33 reports sought for retrieval. Two reports could not be retrieved, and 31 reports were assessed for eligibility. Twenty-one reports were excluded at this stage, resulting in a final corpus of 10 studies published between 2014 and 2026. Reports not retrieved were not treated as full-text exclusions and were not used as substantive evidence in the synthesis.

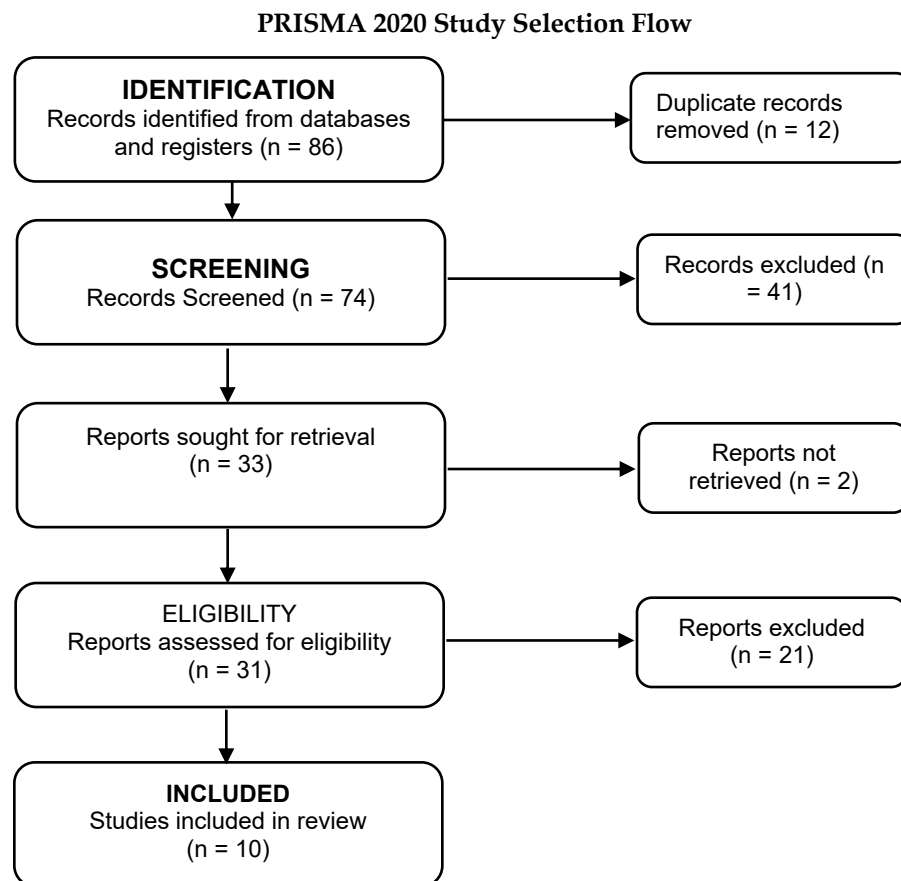


Figure 1. PRISMA 2020 study-selection flow: 86 records identified, 12 duplicates removed, 74 records screened, 41 records excluded, 33 reports sought for retrieval, 2 reports not retrieved, 31 reports assessed for eligibility, 21 reports excluded, and 10 studies included.

Data Extraction

A structured extraction matrix was used for the 10 included studies. Extracted fields covered bibliographic and contextual characteristics, research design and method, operational-efficiency dimensions and indicators, waste types and management approaches, halal operational dimensions, Islamic normative concepts, key findings, research gaps, and mapping to RQ1–RQ5. Halal operational dimensions were kept analytically separate from Islamic normative dimensions to avoid treating compliance mechanisms and normative principles as interchangeable. Reports not retrieved were excluded from data extraction. Screening and data extraction were conducted by the lead author using the predefined eligibility criteria and structured extraction matrix. Final inclusion decisions were made by the lead author based on direct relevance to the review questions and predefined eligibility criteria. The principal extraction domains and illustrative variables used in the review are presented in Table 3.

Table 3. Data Extraction Domains and Variables Used in the Review

Extraction domain	Examples
Study characteristics	Year, context, design, method, analytical focus
Operational efficiency	Process efficiency, PCE, productivity, cost, capacity, yield, resource efficiency

Waste	Process/NVA waste, food/material loss, solid waste, overproduction, excessive resource use
Waste management	Prevention, reduction, recovery, recycling, valorisation
Halal operational dimensions	Assurance, material/process conformity, slaughtering, critical controls
Islamic normative dimensions	Halal-tayyib, israf, maslahah, maqāsid al-sharī'ah
Synthesis fields	Key findings, gaps, RQ mapping

Thematic Analysis and Synthesis

Qualitative thematic and content-based synthesis was used because the studies differed substantially in design, context, and measurement. Coding began with concepts explicitly reported in each study and proceeded iteratively by comparing and grouping related concepts into broader analytical categories. Particular attention was given to convergence and distinction between technical inefficiency and israf; no equivalence between the two concepts was assumed. Higher-order themes were derived from recurrence, conceptual similarity, and relevance to the research questions. The final integrative structure was generated through cross-study synthesis rather than through a predetermined causal model. Reported study evidence and review-derived interpretation were kept distinct throughout the analysis.

Methodological Rigor

Methodological rigor was supported through transparent search documentation, predefined eligibility criteria, conservative treatment of uncertain records, and structured data extraction. PRISMA counts were reconciled across the study-selection stages, while titles, author information, and DOI metadata were checked against available publisher records where possible. Analytical consistency was maintained by distinguishing halal operational dimensions from Islamic normative dimensions and by keeping operational waste conceptually distinct from israf throughout coding and interpretation. Because the framework was derived from a small and heterogeneous evidence base, it is presented as an SLR-derived conceptual framework requiring subsequent empirical validation rather than as a validated causal model.

4. RESULTS AND DISCUSSION

Study Selection

The search identified 86 records across four complementary search sets. After 12 duplicates were removed, 74 records were screened by title and abstract. Forty-one records were excluded, and 33 reports were sought for retrieval. Two reports were not retrieved, leaving 31 reports for eligibility assessment. Twenty-one reports were excluded at eligibility, resulting in 10 studies in the final qualitative synthesis. The included studies were published between 2014 and 2026.

Characteristics of Included Studies

The 10 included studies represent a heterogeneous evidence base spanning conceptual and normative research, theoretical frameworks, systematic literature review, multiple-case research, empirical performance evaluation, descriptive quantitative case analysis, and exploratory/experimental valorisation. Chronologically, the evidence base ranges from early studies on halal food-waste valorisation and lean-halal integrity to more recent studies addressing sustainable production, zero-waste practices, green halal approaches, circular production, and Islamic normative principles. However, operational measurement and explicit Islamic normative integration were rarely examined together within the same study.

The final evidence base comprised 10 studies published between 2014 and 2026 and represented diverse methodological approaches and analytical perspectives. Table 4 summarizes the year, research design or approach, and primary relevance of each included study to the review.

Table 4. Characteristics of Studies Included in the Systematic Review

Study	Year	Design/approach	Primary relevance
Sulaiman et al.	2014	Conceptual/review	Halal food-waste valorisation and biorefinery
Ali et al.	2017	Multiple case studies	Lean production and halal food integrity
Hidayati et al.	2021	Empirical performance evaluation	Sustainable poultry slaughtering, KPIs, waste, halal practice
Çeker	2021	Conceptual/normative	Halal food, israf, overproduction and resource use
Sulaiman	2023	Conceptual/case learning	Industrial halal food waste and zero-waste practice
Junejo et al.	2023	Theoretical framework	Green halal supply chain and sustainability-related performance
Surasa et al.	2026	Conceptual/library research	Shariah efficiency, resource use, maqāṣid and maslahah
Maulana et al.	2026	Descriptive quantitative case	Lean, VSM, PCE and halal assurance
Septiani et al.	2026	Systematic literature review	Circular halal production, resource efficiency and Islamic principles
Sulaiman	2026	Exploratory/experimental	Halal-compliant food-waste valorisation into pet food

Operational Efficiency in Halal Food Production

Operational efficiency emerged as a multidimensional construct rather than a standardized single measure. Across the evidence base, it included process efficiency, productivity, manufacturing cost, capacity utilization, yield, process flow and lead time, resource utilization, and sustainability-related operational performance. Lean-oriented studies emphasized process flow and non-value-added activity reduction. Ali et al. (2017) linked lean production with cost, efficiency, and halal food integrity, while Maulana et al. (2026) used Value Stream Mapping and Process Cycle Efficiency within a halal SME case. Hidayati et al. (2021) evaluated sustainable poultry-slaughtering performance through 16 KPIs aggregated using a Composite Index and Fuzzy-AHP, with improvement priorities involving manufacturing cost, productivity, capacity, yield, waste recycling, and halal practices. Surasa et al. (2026) broadened efficiency conceptually through Shariah-oriented resource optimization and value considerations. Overall, the literature indicates a continuum from technical process performance toward broader resource and sustainability concerns, but no standardized halal-specific operational-efficiency measurement framework was identified.

Operational efficiency was conceptualized across the reviewed studies as a multidimensional construct encompassing process efficiency, productivity, cost efficiency, capacity and yield, process flow and lead time, resource efficiency, and sustainability-related operational performance. These dimensions, their illustrative indicators, and representative studies are synthesized in Table 5.

Table 5. Operational Efficiency Dimensions and Indicators in Halal Food Production

Efficiency dimension	Illustrative indicators/focus	Representative studies
Process efficiency	PCE, process time, NVA reduction, process improvement	Maulana et al. (2026); Ali et al. (2017)
Productivity	Output/resource performance, production improvement	Hidayati et al. (2021); Surasa et al. (2026)
Cost efficiency	Manufacturing cost, cost-quality balance	Hidayati et al. (2021); Ali et al. (2017)
Capacity and yield	Capacity management, yield improvement	Hidayati et al. (2021)
Process flow/lead time	Flow, waiting/lead-time concerns	Ali et al. (2017); Maulana et al. (2026)
Resource efficiency	Responsible/optimal resource utilization	Surasa et al. (2026)
Sustainability-related operational performance	Integrated production and environmental/sustainability concerns	Hidayati et al. (2021); Junejo et al. (2023)

Waste Reduction and Minimization

Waste emerged as a prominent but heterogeneous operational issue. The evidence includes process-related inefficiencies and physical resource losses: non-value-added activities, waiting and lead-time losses, unnecessary movement and transportation, overprocessing, defects, overproduction, food and raw-material losses, solid production waste, excessive resource utilization, and underutilized by-products (Ali et al., 2017; Hidayati et al., 2021; Çeker, 2021; Maulana et al., 2026). Other studies emphasize resource recovery and valorisation of food-processing and slaughterhouse residues (Sulaiman et al., 2014; Sulaiman, 2023; Sulaiman, 2026).

Lean-oriented studies conceptualize waste mainly as activities that consume resources without proportionately contributing to process value. Physical and resource-related waste includes food loss, raw-material loss, solid residues, and excessive use of productive resources. Çeker (2021) adds a normative concern by linking waste and excessive raw-material use with production beyond need. Resource-recovery studies show that halal food-industry residuals can be recycled or converted into value-added outputs through biorefinery and other valorisation routes.

Across these approaches, the cross-study synthesis reveals a progressive waste-minimization pathway: Prevent/Avoid → Reduce → Recover/Recycle → Valorise. This sequence is a review-derived integrative pattern rather than a hierarchy explicitly reported by every study. It shifts attention from end-of-pipe management toward prevention at source while retaining recovery and valorisation for residual streams that remain.

The reviewed literature reveals several distinct but interconnected forms of operational and resource waste, ranging from non-value-added process activities and overproduction to food/material losses and underutilized residual streams. Table 6 synthesizes these waste dimensions, their manifestations, corresponding management approaches, and representative studies.

Table 6. Waste Dimensions and Waste-Minimization Approaches in Halal Food Production

Waste dimension	Examples	Main approaches	Representative studies
Process/NVA waste	Waiting, movement/transport, overprocessing, defects, NVA activities	Lean practices, VSM, process improvement	Ali et al. (2017); Maulana et al. (2026)
Overproduction/excessive resource use	Production beyond need, excessive raw-material use	Prevention, demand-oriented production, responsible resource use	Çeker (2021)
Food and material losses	Food waste, raw-material losses, processing residues	Prevention, reduction, recovery	Sulaiman et al. (2014); Sulaiman (2023); Sulaiman (2026)
Solid production waste	Slaughtering/production residues	Recycling and improved waste management	Hidayati et al. (2021)
Underutilized residual streams	Food-processing and halal-industry residuals	Recovery, biorefinery, value-added conversion	Sulaiman et al. (2014); Sulaiman (2026)
Resource loss in sustainable production	Inefficient resource use and environmental burden	Resource efficiency, circular practices, waste minimization	Septiani et al. (2026); Junejo et al. (2023)

Islamic Normative Integration

Islamic normative integration was evident but less consistently developed than technical and sustainability dimensions. Explicit engagement with halal-tayyib, isrāf, maslahah, and maqāṣid al-sharīʿah was concentrated in a smaller subset of studies, whereas operational studies more often incorporated halal through assurance, integrity, process compliance, or production control. The evidence therefore suggests two related but analytically distinct dimensions: halal operational governance and Islamic normative orientation.

Halal-tayyib operational governance influences materials, processing, handling, slaughtering practices, and operational controls. Ali et al. (2017), Hidayati et al. (2021), and Maulana et al. (2026) show that operational improvement must account for integrity-preserving requirements. The cross-study evidence suggests that halal-related verification, segregation, contamination-prevention, and other integrity-preserving controls may require operational resources while providing necessary assurance value.

The normative dimension concerns the appropriateness and responsibility of resource utilization. Çeker (2021) explicitly links isrāf with excessive raw-material use, unnecessary production, and environmental burden. Surasa et al. (2026) situate efficiency within responsible resource use, maslahah, maqāṣid al-sharīʿah, justice, and economic blessing, while Septiani et al. (2026) connect resource efficiency and waste minimization with halalan tayyiban and maqāṣid-oriented circular production. Operational waste and isrāf should nevertheless not be treated as synonyms. Operational waste represents a measurable technical inefficiency, whereas isrāf provides a normative criterion for evaluating excessive or inappropriate resource utilization; their intersection lies in the pursuit of responsible resource use.

The synthesis further indicates that halal operational governance and Islamic normative orientation are related but analytically distinct dimensions. Table 7 summarizes the principal halal and Islamic

normative dimensions identified in the literature, their operational relevance, and the studies in which these dimensions are represented.

Table 7. Islamic Normative and Halal Operational Dimensions in Halal Food Production

Dimension	Operational relevance	Representative studies
Halal integrity and assurance	Operational requirements for materials, processing, handling and control	Ali et al. (2017); Maulana et al. (2026)
Halal production practices	Halal requirements integrated with production improvement	Hidayati et al. (2021)
Halal-tayyib	Permissible, appropriate and responsible production orientation	Surasa et al. (2026); Septiani et al. (2026)
Isrāf avoidance	Normative restraint against excessive/inappropriate resource use and unnecessary production	Çeker (2021); Surasa et al. (2026); Septiani et al. (2026)
Maslahah	Broadens objectives beyond narrow economic efficiency	Surasa et al. (2026)
Maqāṣid al-sharī'ah	Broader normative orientation for resource use and sustainability	Surasa et al. (2026); Septiani et al. (2026)
Shariah-compliant resource recovery	Recovered/valorised resources remain compatible with Shariah requirements	Sulaiman (2026)

Thematic Synthesis and Research Gaps

The cross-study synthesis identified five interconnected themes: (1) operational efficiency and performance, (2) waste minimization and circular resource use, (3) halal integrity embedded in operations, (4) Islamic normative integration, and (5) sustainability and value-oriented outcomes. The themes were not equally represented across all studies, but collectively they reveal an emerging structure connecting technical improvement with halal governance and Islamic normative orientation.

Cross-study synthesis generated five interconnected themes that collectively link technical operational improvement, waste minimization, halal governance, Islamic normative principles, and sustainability-oriented outcomes. Table 8 presents these emerging themes together with their principal elements and the corresponding research gaps identified from the reviewed literature.

Table 8. Emerging Themes and Research Gaps in Sustainable Halal Operations

Emerging theme	Main elements	Principal gap
1. Operational efficiency and performance	Process efficiency, PCE, productivity, cost, capacity, yield, flow, resource efficiency, sustainable performance	No standardized halal-specific operational-efficiency measurement framework
2. Waste minimization and circular resource use	NVA waste, food/material losses, excess resource use, prevention, reduction, recycling, recovery, valorisation	Fragmented waste classifications and measurement approaches
3. Halal integrity embedded in operations	Assurance, material/process conformity, critical controls, slaughtering and handling practices	Halal integrity not consistently integrated with operational-performance measurement
4. Islamic normative integration	Halal-tayyib, isrāf, maslahah, maqāṣid al-sharī'ah, responsible resource utilization	Islamic principles remain weakly operationalized and predominantly conceptual
5. Sustainability and value-oriented outcomes	Economic/environmental performance, conservation, waste-to-value, welfare and maslahah	Limited empirical integration of operational, halal, Islamic, and sustainability outcomes

Four major gaps emerge. First, measurable operational performance and Islamic normative orientation remain fragmented. Second, relatively few studies focus on the internal production-operations level compared with broader supply-chain, certification, or sustainability perspectives. Third, waste approaches remain dispersed across lean, environmental, circular, and normative literatures. Fourth, Islamic Operations Management lacks robust empirical operationalization, particularly for *isrāf*, *maslahah*, and *maqāṣid*-oriented decision criteria.

Collectively, the cross-study synthesis generated an emerging integrative structure: Islamic Normative Foundations → Halal-Tayyib Operational Governance → Production Operations → Operational Efficiency ↔ Waste Minimization → Sustainable Performance and Maslahah-Oriented Outcomes. This structure is an SLR-derived conceptual synthesis rather than an empirically validated causal model.

Discussion

Integrating Operational Efficiency, Waste Reduction, and Halal Integrity

The findings indicate that operational efficiency, waste reduction, and halal integrity should not be treated as independent objectives. Cross-study synthesis suggests an interconnected nexus: Operational Efficiency ↔ Waste Reduction ↔ Halal Integrity. Improvements in process efficiency can reduce unnecessary resource consumption and operational losses; waste reduction can improve resource productivity and sustainability; and halal integrity establishes the requirements within which these improvements must occur.

This nexus extends the conventional interpretation of operational efficiency. Process time, productivity, cost, capacity, yield, flow, and resource utilization remain important, but halal production adds a governance condition: improvement must preserve material integrity, process conformity, and necessary halal controls. This has implications for the interpretation of value and waste. Activities that

consume time or resources may still be necessary to prevent contamination, maintain segregation, verify conformity, or otherwise preserve halal integrity. Accordingly, halal integrity modifies the operational definition of value by introducing assurance value.

Waste reduction provides a bridge between efficiency and sustainability. The evidence spans process improvement, elimination of NVA activities, food-loss reduction, recycling, recovery, and valorisation. The pathway Prevent/Avoid → Reduce → Recover/Recycle → Valorise distinguishes upstream prevention from downstream management. Recovery is valuable, but it should not substitute for reasonable efforts to prevent avoidable losses at source.

This perspective complements circular halal production. Circularity emphasizes retention, recovery, regeneration, and valorisation of resource value (Septiani et al., 2026). The present synthesis adopts a broader production-operations focus that also includes process efficiency, productivity, cost, capacity, yield, resource use, waste prevention, halal controls, and continuous improvement. Sustainable halal operations therefore require integrated consideration of efficiency, waste reduction, and halal compliance rather than their isolated pursuit.

From Operational Waste to Isrāf Avoidance

One of the most important conceptual implications concerns the relationship between operational waste and the Islamic principle of *isrāf*. The concepts converge around unnecessary resource utilization but should not be treated as equivalent. Operational waste originates primarily from technical and managerial diagnosis, whereas *isrāf* introduces a normative evaluation of excess and inappropriate resource use. Maintaining this distinction avoids merely relabelling established operations-management concepts with Islamic terminology.

From an operations-management perspective, waste can be observed through NVA activities, waiting, unnecessary movement or transportation, overprocessing, defects, overproduction, food/material losses, and inefficient resource use (Ali et al., 2017; Hidayati et al., 2021; Maulana et al., 2026). These losses can be measured and addressed using process improvement, lean practices, prevention, recycling, recovery, and valorisation.

The Islamic concept of *isrāf* introduces a normative concern regarding excess. The Qur'an states in Al-A'rāf 7:31: "Eat and drink, but be not excessive. Indeed, He does not like those who commit excess." A related prohibition appears in Al-An'ām 6:141 in an agricultural and harvest context: "And be not excessive. Indeed, He does not like those who commit excess." These verses are used here as normative foundations for restraint and responsible resource use, not as technical definitions of contemporary operational waste or modern efficiency metrics.

The reviewed literature supports this distinction. Çeker (2021) connects *isrāf* with excessive raw-material use, unnecessary production, and environmental burden. Surasa et al. (2026) situate efficiency within a broader Shariah-oriented understanding of responsible resource use, *maslahah*, and *maqāsid al-sharī'ah*, while Septiani et al. (2026) connect *isrāf* avoidance with resource efficiency and waste minimization. Accordingly, operational waste represents a measurable technical inefficiency, whereas *isrāf* provides a normative criterion for evaluating excessive or inappropriate resource utilization; their intersection lies in responsible resource use.

Not every technical inefficiency should automatically be labelled *isrāf*, and *isrāf* may extend beyond conventional waste categories. A technically efficient system can still raise normative questions if it produces substantially beyond meaningful need or encourages unnecessary resource consumption. Likewise, halal-related verification, segregation, monitoring, sanitation, or integrity-preserving procedures should not automatically be classified as waste when they provide legitimate assurance value.

The waste-minimization pathway acquires additional meaning from this perspective. Prevention and avoidance question whether unnecessary resource use should arise in the first place, whereas recycling and valorisation address residual streams after generation. The Qur'anic prohibition of *isrāf* provides the normative rationale, operational waste analysis provides the technical diagnosis, and waste-minimization practices provide the managerial mechanisms through which responsible resource utilization can be pursued.

Islamic Sustainable Halal Operations Framework (ISHOF)

To integrate the fragmented dimensions identified in the review, this study proposes the Islamic Sustainable Halal Operations Framework (ISHOF) as an SLR-derived conceptual framework for halal food production. ISHOF reorganizes the five thematic domains into five interconnected layers: (1) Islamic Normative Foundations, (2) Halal-Tayyib Operational Governance, (3) Production Operations, (4) Operational Efficiency and Waste Minimization, and (5) Sustainable Performance and Maslahah-Oriented Outcomes. A continuous-improvement feedback mechanism connects outcomes with subsequent evaluation and improvement.

Layer 1: Islamic Normative Foundations – Why?

This layer provides the normative orientation through halal-tayyib, avoidance of *isrāf*, *maslahah*, and *maqāṣid al-sharī'ah*. These principles are not treated as technical indicators; they provide the rationale and evaluative orientation for responsible production and resource use.

Layer 2: Halal-Tayyib Operational Governance – Within what boundaries?

This layer translates normative orientation into operational boundaries through halal assurance, material integrity, process conformity, critical controls, hygiene and safety requirements, monitoring, and integrity-preserving practices. Halal governance is treated as an operational design requirement rather than merely an external certification constraint.

Layer 3: Production Operations – Where?

The operational locus is the internal transformation system: Halal Raw Materials → Processing/Transformation → In-Process Handling → Quality and Halal Control → Halal Products and By-products. External supply-chain actors are relevant when they directly influence production integrity or performance, but they are not the principal unit of analysis.

Layer 4: Operational Efficiency ↔ Waste Minimization – How?

Operational efficiency includes process efficiency, productivity, cost, capacity, yield, flow, lead time, and resource efficiency. Waste minimization follows Prevent/Avoid → Reduce → Recover/Recycle → Valorise. The bidirectional relationship reflects that improved resource use can reduce waste and that waste reduction can improve operational performance.

Layer 5: Sustainable Performance and Maslahah-Oriented Outcomes – What outcomes?

The expected outcomes include economic performance, environmental performance, resource conservation, halal integrity, value creation, and broader *maslahah*-oriented outcomes. These are conceptually proposed dimensions rather than empirically established causal effects.

Continuous-Improvement Feedback

ISHOF is not purely linear. Performance outcomes should feed back into governance, production design, efficiency initiatives, and waste-minimization practices. Persistent material loss, halal-integrity deviations, high resource intensity, or residual generation can trigger redesign and reprioritization.

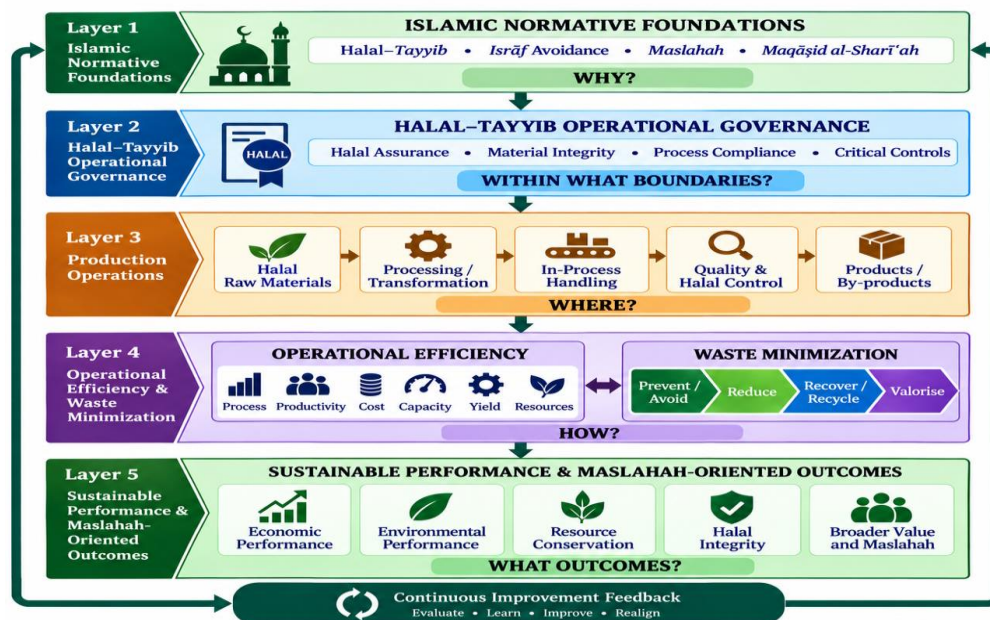


Figure 2. Proposed Islamic Sustainable Halal Operations Framework (ISHOF).

ISHOF is complementary to circular halal production rather than competing with it. Circular halal production asks how resource value can be retained, recovered, and regenerated through circular flows. ISHOF asks how halal food production can improve operational efficiency and minimize waste while remaining governed by halal-tayyib requirements and Islamic normative principles. Circular strategies therefore sit within the waste-minimization mechanism of the broader operational framework.

The core proposition is: Islamic principles do not replace established operations-management tools; rather, they provide normative guidance concerning the objectives, boundaries, and broader interpretation of operational improvement in halal food production. ISHOF should therefore be interpreted as a conceptual research framework rather than an empirically validated causal model.

Theoretical Implications

This review offers four principal theoretical implications. First, operational efficiency in halal food production is extended beyond productivity and cost toward a technically measurable but governance-bounded construct. Efficiency must be evaluated together with the ability to preserve halal-tayyib integrity while using resources effectively.

Second, the review distinguishes operational waste from *isrāf*. Operational waste provides a technical diagnosis of inefficiency, whereas *isrāf* provides a normative criterion for evaluating excessive or inappropriate resource utilization. Their intersection—responsible resource utilization—creates a conceptual bridge between conventional operations management and Islamic normative reasoning without collapsing the two constructs.

Third, halal integrity is repositioned from an external compliance requirement toward an operational-governance construct. Material selection, processing, handling, controls, and integrity-preserving activities shape operational decisions and may create assurance value even when they do not physically transform the product.

Fourth, ISHOF provides an integrative theoretical architecture for Islamic Operations Management. Islamic normative foundations address why resources should be managed responsibly; halal-tayyib governance defines within what boundaries improvement occurs; production operations identify where

improvement takes place; efficiency and waste minimization explain how improvement can be pursued; and sustainable and masalah-oriented performance specifies toward what broader outcomes these efforts are directed.

The central theoretical proposition is that Islamic Operations Management can be conceptualized as the integration of technically grounded operational improvement with halal-tayyib governance and Islamic normative orientation, whereby efficiency and waste-minimization mechanisms are pursued within halal-integrity boundaries and directed toward responsible resource utilization, sustainable performance, and broader masalah. This proposition represents theory-building from systematic qualitative synthesis rather than theory testing.

Managerial Implications

The managerial implication of ISHOF is that operational efficiency, waste minimization, and halal integrity should be managed as an integrated operational agenda. Producers should establish a baseline of process time, productivity, cost, capacity utilization, yield, defect rates, material losses, and other context-relevant resource indicators while simultaneously identifying controls necessary to preserve halal integrity.

Managers should prioritize prevention-oriented waste management using Prevent/Avoid → Reduce → Recover/Recycle → Valorise. Before investing primarily in downstream recycling or valorisation, they should investigate whether overproduction, defects, excessive raw-material use, process variability, or unnecessary consumption of energy, water, and time can be prevented or reduced at source. Recovery and valorisation should also remain compatible with halal-tayyib and safety requirements.

Isrāf should not be treated as another lean-waste category. In practice, managers can ask two complementary questions: Where and how are resources being lost or used inefficiently? and Is this level and pattern of resource use necessary, proportionate, and responsible? The first is technical; the second is normative.

To translate the conceptual architecture of ISHOF into managerial practice, each framework layer can be associated with a specific managerial question and corresponding operational focus. Table 9 summarizes this translation from normative foundations and halal governance to production improvement, waste minimization, and sustainable performance outcomes.

Table 9. Managerial Application of the Islamic Sustainable Halal Operations Framework (ISHOF)

ISHOF layer	Managerial question	Illustrative managerial focus
Islamic Normative Foundations	Why should we improve?	Responsible resource use, avoidance of excess, masalah, halal-tayyib orientation
Halal-Tayyib Operational Governance	Within what boundaries?	Assurance, material integrity, process compliance, critical controls
Production Operations	Where should we improve?	Raw materials, processing, handling, quality/halal control, products/by-products
Operational Efficiency ↔ Waste Minimization	How should we improve?	Productivity, process, cost, capacity, yield, resources; prevent, reduce, recover, recycle, valorise
Sustainable Performance & Masalah-Oriented Outcomes	What outcomes should be monitored?	Economic/environmental performance, conservation, halal integrity, broader value

ISHOF does not require replacing established tools. VSM, lean practices, productivity analysis, process-performance measurement, material/resource accounting, waste audits, and halal assurance can retain their technical functions. Based on the proposed framework, a practical sequence for future managerial application is: Measure operational performance → identify avoidable losses → preserve necessary halal controls → prioritize prevention before downstream waste management → improve continuously → evaluate broader sustainable and maslahah-oriented outcomes.

Future Research Directions

A key priority for future research is the empirical development and validation of ISHOF. The framework is derived from qualitative cross-study synthesis rather than causal testing; its five layers therefore require operationalization into measurable constructs and examination across different halal food-production contexts.

A first research direction is the development and validation of ISHOF constructs and indicators. Future studies should distinguish directly measurable operational indicators from perceptual and normative constructs and evaluate reliability, validity, and contextual applicability. A second priority is operationalization of *isrāf* without simply renaming conventional lean-waste categories. Research could combine objective indicators such as material loss, overproduction, resource intensity, and avoidable consumption with validated normative measures of responsible resource use.

A third direction is empirical examination of halal integrity and operational efficiency. Future studies should test whether well-designed halal governance merely creates additional burden or can improve process discipline, quality consistency, traceability, defect prevention, and operational reliability. This would enable the concept of assurance value to be tested.

A fourth priority is comparative analysis of Prevent/Avoid → Reduce → Recover/Recycle → Valorise. Research should examine the relative operational, economic, environmental, and halal-related implications of upstream prevention versus downstream recovery and valorisation. A fifth direction is testing relationships among Islamic normative orientation, halal-tayyib operational governance, operational efficiency, waste minimization, and sustainable performance, while considering contextual moderators such as firm size, technology, product type, regulation, resource intensity, and organizational capability.

Methodologically, research can progress from multiple-case studies and framework refinement toward longitudinal and action research, material-flow analysis, life-cycle assessment, productivity/efficiency analysis, lean-performance measurement, mixed methods, and subsequent quantitative relationship testing. Comparative studies across SMEs, large manufacturers, slaughterhouses, and different food-processing subsectors can clarify the boundary conditions of ISHOF.

Overall, future research can progressively develop ISHOF through: Conceptual Refinement → Construct Operationalization → Measurement Validation → Contextual Testing → Relationship Testing → Framework Refinement. This sequence can move the framework from an SLR-derived conceptual architecture toward an empirically grounded model of sustainable halal operations.

5. CONCLUSION

This systematic literature review examined the intersection of operational efficiency, waste reduction, halal food production, and Islamic normative principles from an Islamic Operations Management perspective. Based on the final synthesis of 10 studies published between 2014 and 2026, the review indicates that these research streams are increasingly interconnected, although their integration at the production-operations level remains limited and fragmented.

The findings indicate that operational efficiency in halal food production extends beyond conventional cost reduction. It encompasses process efficiency, productivity, capacity utilization, yield, resource utilization, process flow, and sustainable performance, while operating within requirements for halal integrity. Waste reduction similarly extends beyond the elimination of non-value-added activities to include food and material losses, excessive resource utilization, overproduction, recovery, recycling, and waste valorisation. These findings support an integrated efficiency-waste-halal nexus, in which operational improvement should simultaneously enhance resource performance, minimize avoidable losses, and preserve halal-tayyib integrity.

A key conceptual contribution of this review is the distinction between operational waste and *isrāf*. Operational waste represents technically identifiable and measurable inefficiency, whereas *isrāf* provides a normative criterion for evaluating excessive, unnecessary, or inappropriate resource utilization. The two concepts should therefore not be treated as synonymous. Their intersection lies in the pursuit of responsible resource utilization, whereby technical waste-reduction mechanisms can operate within a broader Islamic normative orientation toward moderation, responsibility, and beneficial resource use.

The synthesis further identifies a progressive waste-management pathway of Prevent/Avoid → Reduce → Recover/Recycle → Valorise. This pathway expands the focus from downstream waste treatment toward prevention at source. From an Islamic Operations Management perspective, such a preventive orientation is particularly important because it directs attention not only to how waste should be managed after generation, but also to whether unnecessary resource use, excessive production, and avoidable losses should occur in the first place.

Based on the cross-study synthesis, this review proposes the Islamic Sustainable Halal Operations Framework (ISHOF). The framework integrates five interconnected layers: (1) Islamic Normative Foundations, (2) Halal-Tayyib Operational Governance, (3) Production Operations, (4) Operational Efficiency and Waste Minimization, and (5) Sustainable Performance and Maslahah-Oriented Outcomes, supported by a continuous-improvement feedback mechanism. In this structure, Islamic principles do not replace established operations-management tools; rather, they provide normative guidance concerning the objectives, boundaries, and broader interpretation of operational improvement, while established operational methods provide the technical mechanisms for achieving efficiency and minimizing waste.

The review nevertheless has several limitations. The final evidence base consists of only 10 studies with heterogeneous methodological designs and analytical perspectives. The included literature also varies in the extent to which operational performance, halal integrity, sustainability, and Islamic normative principles are explicitly integrated. In addition, screening and data extraction were conducted by a single lead reviewer, which may have increased the potential for reviewer-related selection and interpretation bias. Moreover, the proposed relationships within ISHOF have been derived from qualitative cross-study synthesis and have not yet been empirically validated as causal relationships. The use of a single bibliographic database and the inability to retrieve two potentially relevant full-text reports may also have limited the comprehensiveness of the evidence base.

Future research should therefore focus on the operationalization and empirical validation of ISHOF across different halal food-production contexts. Particular attention should be given to developing measurable indicators linking operational efficiency, waste minimization, halal-tayyib governance, and responsible resource utilization without reducing *isrāf* to a conventional operational-waste construct. Comparative studies across SMEs, large food manufacturers, slaughterhouses, food-processing industries, and different institutional contexts would further clarify the applicability and boundaries of the framework. Longitudinal studies, multiple-case research, mixed methods, and quantitative model testing

may subsequently examine how the proposed ISHOF dimensions interact and contribute to sustainable operational performance.

Overall, this review positions Islamic Sustainable Halal Operations as a developing research domain at the intersection of operations management, halal production, sustainability, and Islamic normative principles. By connecting measurable operational improvement with halal-tayyib governance and the avoidance of *isrāf*, ISHOF provides a conceptual foundation for advancing halal food production toward systems that are not only more efficient and less wasteful, but also operationally responsible and oriented toward broader *maslahah*.

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