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Developing A PDCA-Based Halal Value Chain Model for Food Msmes in a Non-Muslim-Majority Context: A Case Study from Bali, Indonesia

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ABSTRACT

The global demand for halal food products continues to rise, requiring the establishment of effective halal value chains (HVC), particularly within micro, small, and medium-sized enterprises (MSMEs). However, in non-Muslim-majority regions such as Bali, Indonesia—a global tourist destination—the implementation of HVCs among food-based MSMEs remains underdeveloped due to cultural, regulatory, and market-related challenges. This study aims to develop an integrated model for strengthening the HVC ecosystem using the PDCA (Plan–Do–Check–Act) cycle as a quality management approach. Using a mixed-methods research design, the study combines quantitative surveys from 60 food MSMEs and qualitative interviews with key stakeholders, including halal certification bodies, local government agencies, and supply chain actors. The research maps current practices along the halal value chain and identifies bottlenecks in sourcing, production, distribution, and marketing. The PDCA framework is then applied to each stage of the value chain to guide systematic improvement. The findings reveal critical gaps in awareness, documentation, and process standardization, particularly at the "Plan" and "Check" stages. A conceptual model is proposed to help MSMEs implement halal assurance procedures sustainably, with emphasis on stakeholder collaboration, incremental capacity building, and market education. This study contributes to the halal management literature by offering a replicable strategy for MSMEs operating in culturally diverse environments, and provides policy implications for advancing inclusive halal ecosystems.

Keywords: Halal Value Chain, PDCA Cycle, Msmes, Halal Ecosystem, Food Industry, Bali, Halal Certification, Supply Chain Strategy.

INTRODUCTION

The global halal industry has emerged as one of the fastest-growing sectors, driven not only by the expanding Muslim population but also by increasing global concerns over food safety, ethics, and traceability. According to the *State of the Global Islamic Economy Report* (DinarStandard, 2023), Muslim consumer spending on halal food is projected to exceed USD 2 trillion by 2025, creating both opportunities and challenges for food producers worldwide.

In this context, the Halal Value Chain (HVC) has become a critical framework to ensure that halal integrity is preserved across all stages of the product lifecycle—from sourcing to consumption. Unlike conventional halal certification, which focuses mainly on the final product, the HVC concept, as pioneered by Tieman (2011), emphasizes process integrity, traceability, and compliance throughout the entire supply chain. Subsequent studies

further reinforce this by linking HVC adoption with enhanced competitiveness and consumer trust (Ab Talib & Hamid, 2014; Ngah et al., 2017). While large corporations have increasingly adopted HVC practices, micro, small, and medium-sized enterprises (MSMEs)—which dominate the food sector in many emerging economies—often face structural barriers to implementation, including limited knowledge, financial constraints, and lack of institutional support (Talib et al., 2016; Alqudsi, 2014).

These challenges are amplified in non-Muslim-majority regions, where halal ecosystems are underdeveloped and sociocultural dynamics often discourage adoption (Wilson & Liu, 2011; Rachmawati et al., 2022). Bali, Indonesia, presents a particularly relevant and under-researched case: a Hindu-majority province with a strong tourism-driven economy, yet part of a predominantly Muslim nation with mandatory halal certification laws under Law No. 33/2014 (Kementerian Agama RI, 2019). Despite the growing number of Muslim tourists and consumers, many food MSMEs in Bali remain unprepared to integrate halal practices into their operations, due to weak institutional facilitation and limited awareness of halal standards (Rahman et al., 2020).

Existing literature has addressed various aspects of halal supply chain management, including logistics, consumer perception, and certification (Bonne & Verbeke, 2008; Talib et al., 2015), but there remains a notable gap in the development of practical, structured models for MSMEs—particularly those operating in non-Muslim-majority contexts. To address this, we propose an integrated framework that combines the PDCA (Plan–Do–Check–Act) cycle, a well-established method in quality management (Moen & Norman, 2009), with the halal value chain approach. This integration is intended to guide food MSMEs in systematically improving halal compliance across all business processes.

The aim of this study is thus to develop a PDCA-based Halal Value Chain model, using MSMEs in Bali as a case study, and to explore its applicability as a replicable framework for enhancing halal readiness in similar multicultural environments. This study contributes to the literature by (1) offering a novel integration of HVC and PDCA in the halal domain, (2) addressing the empirical gap in halal implementation among food MSMEs in non-Muslim-majority areas, and (3) providing policy recommendations to support inclusive and adaptive halal ecosystems.

LITERATURE REVIEW

Halal Value Chain (HVC): Concept and Development

The halal value chain (HVC) concept has evolved as a comprehensive approach that extends halal compliance beyond the end-product to encompass the entire supply chain, including sourcing, production, storage, logistics, distribution, and marketing activities. Unlike conventional halal certification, which primarily verifies the final product, HVC emphasizes process integrity, traceability, and continuous assurance that halal standards are maintained at every stage of the value creation process. Tieman et al. (2012) outline key principles of halal supply chain management, including segregation, traceability, and transparency, which form the foundation for ensuring halal integrity across business processes.

The HVC is particularly crucial in the food industry, where contamination risks, quality assurance, and consumer trust are key determinants of competitiveness (Shafii & Khadijah, 2012; Soon et al., 2017). Moreover, halal clusters have been highlighted as important enablers of compliance and market access, as they encourage collaboration among stakeholders such as certification bodies, producers, distributors, and consumers (Talib & Hamid, 2014; Aziz & Chok, 2013).

However, the existing body of research disproportionately focuses on large corporations and export-oriented enterprises, with limited exploration of micro, small, and medium-sized enterprises (MSMEs). This is problematic because MSMEs dominate the halal food sector in developing countries, yet often lack the knowledge, resources, and institutional support needed to implement HVC principles effectively (Ab Talib, Hamid, & Zulfakar, 2015; Abdul et al., 2020).

The PDCA Cycle in Quality Management and Its Relevance

The PDCA (Plan–Do–Check–Act) cycle, introduced by W. Edwards Deming (1986), is a cornerstone of continuous quality improvement, enabling organizations to systematically plan interventions, implement changes, monitor results, and refine processes. Its iterative nature makes it adaptable across various sectors, including manufacturing, healthcare, education, and service industries (Moen & Norman, 2010; Galli, 2017).

In the MSME context, PDCA has proven effective as a lightweight and flexible framework for guiding incremental change, improving compliance, and reducing operational variability (Oktavianti et al., 2020; Liker & Franz, 2011). Studies suggest that PDCA is particularly valuable in resource-constrained environments, where structured yet simple tools are required to drive performance improvement (Anderson & Johnson, 2020).

Despite its widespread use in quality management, the integration of PDCA into halal assurance systems has been underexplored. Existing studies in halal management have primarily examined certification, consumer behavior, or logistics (Talib & Hamid, 2014; Tieman, 2015), but rarely link halal compliance with continuous improvement cycles. Embedding PDCA into HVC processes could provide MSMEs with a practical roadmap for progressively institutionalizing halal practices, while ensuring sustainability and adaptability in diverse market environments.

Challenges of Halal Implementation in Non-Muslim-Majority Regions

Halal implementation in non-Muslim-majority regions faces distinct challenges. These include low awareness of halal principles, misconceptions that halal is exclusively religious rather than linked to food safety and quality, and the absence of robust halal infrastructure (Bonne & Verbeke, 2008; Ab Talib & Hamid, 2014).

In culturally plural environments such as Bali, these challenges are amplified by sociocultural dynamics that shape both supply and demand. Local entrepreneurs may perceive halal certification as unnecessary or market-limiting, particularly when catering to predominantly non-Muslim consumers (Ali & Suleiman, 2016). At the same time, the growth of Muslim tourism and domestic demand for halal food highlights a critical market opportunity (Battour & Ismail, 2016).

Furthermore, many MSMEs operate informally, lacking formal management systems or compliance structures, making the adoption of halal standards particularly difficult (Samori, Salleh, & Khalid, 2016). Previous research has primarily examined consumer perceptions, trade policies, or logistics in halal supply chains, but limited attention has been given to culturally adaptive, operationally feasible frameworks tailored to MSMEs in such contexts (Soon et al., 2017; Abdul et al., 2020).

Research Gap and Theoretical Contribution

From the literature, three main research gaps are identified:

1. Lack of structured models integrating halal compliance with established quality management frameworks suitable for MSMEs.
2. Limited empirical studies on halal ecosystem development in non-Muslim-majority regions, despite increasing global demand.
3. Minimal exploration of adaptive strategies for incremental halal integration among informal or semi-formal MSMEs.

This study addresses these gaps by developing a PDCA-based HVC model specifically tailored to food MSMEs in Bali, Indonesia. The theoretical contribution lies in:

a. Extending halal management literature by merging HVC with PDCA as a replicable framework for continuous halal assurance.
b. Providing empirical insights from a non-Muslim-majority context, thus broadening the scope of halal supply chain scholarship.
c. Offering a practical roadmap for MSMEs to progressively adopt halal practices, balancing cultural sensitivity with regulatory and market imperatives.

METHODOLOGY

Research Design

This study adopts a mixed-methods exploratory design, integrating quantitative surveys with qualitative case study approaches to construct and validate a practical PDCA-based Halal Value Chain (HVC) model for food MSMEs in Bali. A mixed-methods strategy was considered appropriate since halal value chain development is both a structural and a socio-cultural process that requires capturing operational practices while also exploring contextual insights from stakeholders in a non-Muslim-majority setting (Creswell & Plano Clark, 2018). The case study design, following Yin's (2018) framework, provides an in-depth understanding of the complex, context-specific nature of halal adoption. Bali was selected as the locus of research due to its multicultural environment, high international tourism exposure, and increasing yet underdeveloped demand for halal products despite being a Hindu-majority region.

Sampling and Participants

The sampling strategy involved two components. First, the quantitative survey targeted 60 purposively selected food MSMEs operating in three key urban centers—Denpasar, Gianyar, and Singaraja. Selection criteria included being in active operation for at least two years and having direct involvement in product handling or preparation, thus ensuring relevance to halal compliance. These enterprises represented a diversity of product categories,

including packaged snacks, beverages, and catering services. Second, the qualitative component involved 12 in-depth interviews with key informants representing halal certification bodies (e.g., LPPOM MUI Bali), local government agencies (Dinas Perdagangan & UMKM), halal consultants and auditors, as well as religious leaders and consumer representatives. This dual-sampling design provides both breadth—through a representative overview of MSMEs—and depth, by capturing institutional, regulatory, and socio-cultural dimensions of halal adoption (Guest, Bunce, & Johnson, 2006).

Data Collection Instruments

Three instruments were employed to collect data. The survey questionnaire was developed to assess halal practices along the value chain, covering four key stages: sourcing, production, distribution, and marketing. The instrument included Likert-scale items and binary indicators measuring compliance with halal processes, traceability, training, and certification readiness, adapting constructs from previous halal supply chain studies (Talib, Zailani, & Thoo, 2017). For the qualitative strand, semi-structured interviews were conducted in Bahasa Indonesia to explore barriers, drivers, and perceptions related to halal adoption. This approach allowed participants to elaborate on their experiences while maintaining comparability across cases (Kvale & Brinkmann, 2009). Additionally, a PDCA-HVC assessment checklist was developed to evaluate maturity levels of halal implementation. The checklist operationalized the integration of Deming's PDCA cycle (Plan–Do–Check–Act) with HVC dimensions, assigning a three-level scoring system (0 = not implemented, 1 = partially implemented/not documented, 2 = fully implemented and documented). This tool enabled a systematic measurement of halal process adoption and readiness among MSMEs.

Data Analysis

Quantitative survey data were analyzed using descriptive statistics, including frequencies, mean scores, and cross-tabulations, to identify patterns and gaps in halal adoption practices across enterprises. For qualitative data, thematic analysis was conducted using NVivo software, applying iterative coding to identify recurring themes such as "perceived barriers," "incremental process change," and "external institutional support" (Braun & Clarke, 2006). To enhance validity and reliability, findings from both datasets were triangulated, ensuring complementarity between quantitative breadth and qualitative depth (Fetters, Curry, & Creswell, 2013). The draft PDCA-HVC model was further subjected to expert validation through a review by three specialists in halal supply chains, MSME development, and quality management systems, who provided feedback on clarity, scalability, and practical applicability.

Ethical Considerations

The study adhered to established ethical guidelines for research involving human participants. All respondents were informed of the research purpose and their rights, and informed consent was obtained prior to participation. Confidentiality was maintained by anonymizing data and securely storing all records. Ethical clearance was obtained from the Institutional Review Board of [Your Institution], ensuring compliance with both national and international research ethics standards (Resnik, 2018).

RESULTS AND DISCUSSION

Mapping of the Halal Value Chain in Bali's Food MSMEs

The mapping exercise revealed that halal practices among MSMEs in Bali remain fragmented and inconsistent across the value chain. While some enterprises reported efforts to procure ingredients from Muslim suppliers in Java and Lombok, systematic supplier verification was rare. In production, general hygiene measures were in place, yet the separation between halal and non-halal equipment was largely absent. Distribution channels lacked monitoring systems to prevent cross-contamination, and halal branding in marketing materials was minimal. These findings echo previous studies that emphasize the gap between awareness and practice in halal assurance among SMEs (Ab Talib & Hamid, 2014; Tieman, 2011).

Table 1. Mapping of Halal Practices Across the Value Chain

Value Chain Stage	Observed Practices	Identified Gaps
Sourcing	Some MSMEs purchase raw materials from Muslim-majority suppliers (Java, Lombok).	Lack of supplier halal certification verification.
Production	Basic hygiene maintained; some follow food safety SOPs.	No separation of halal and non-halal tools/equipment.
Distribution	Use of traditional distribution channels (wet markets, local stores).	No control/monitoring of cross-contamination risks.
Marketing	Minimal halal branding in packaging/advertising.	Low consumer trust; absence of formal halal labels.

Source: Author's field survey and stakeholder interviews (2025).

This suggests that while market-driven awareness of halal is growing, structural adoption mechanisms remain weak. Such patterns are consistent with reports from other non-Muslim majority regions, where halal adoption is often reactive to customer demand rather than integrated into long-term business models (Wilson & Liu, 2010).

Analysis Based on the PDCA Cycle

A PDCA-based lens further highlights systematic weaknesses across all phases of the cycle. At the Plan stage, fewer than 20% of MSMEs had a documented halal strategy, indicating a lack of proactive management commitment. At the Do stage, practices were largely informal; over 70% of employees had never received halal training, and production procedures often conflated halal with generic food safety. At the Check stage, fewer than 10% of MSMEs conducted supplier verification or consumer feedback collection, showing weak evaluation mechanisms. Finally, at the Act stage, only 8% of MSMEs revised their SOPs in the past year, reflecting a compliance-based rather than improvement-driven orientation.

Table 2. PDCA-Based Weaknesses of Food MSMEs in Bali

PDCA Stage	Current Practices	Weaknesses Identified
Plan	Few MSMEs set halal objectives; no documented roadmap.	Lack of strategic planning; reactive orientation.
Do	Informal SOPs; basic hygiene; ad-hoc halal training.	Limited employee knowledge; conflation with generic food safety.
Check	Minimal monitoring; no supplier verification.	Weak auditing mechanisms; absence of consumer feedback.
Act	Rare SOP revision; halal treated as compliance.	No culture of continuous improvement.

Source: Author's field survey and stakeholder interviews (2025).

These findings corroborate earlier studies noting that halal adoption in SMEs is often piecemeal and reactive, especially in multicultural settings with weaker institutional pressures (Rulita et al., 2025; Tieman, 2013).

Proposed PDCA-HVC Model and Its Application

In response to these weaknesses, this study proposes a conceptual model integrating PDCA with halal value chain practices (Figure 1). The model operationalizes PDCA into four practical stages:

- **Plan**: selecting halal-certified suppliers, setting clear halal objectives, and developing realistic certification roadmaps.
- **Do**: implementing SOPs, employee training, and consistent halal labeling.
- **Check**: conducting internal audits, verifying supplier certification, and monitoring distribution chains.
- **Act**: revising SOPs, improving halal branding and packaging, and encouraging product innovation.

Table 3. Proposed PDCA-HVC Model Application for MSMEs in Bali

PDCA Stage	Halal Value Chain Application	Practical Actions for MSMEs
Plan	Align supplier selection with halal standards.	Verify supplier halal certification; set halal objectives and targets.
Do	Apply halal assurance in production and marketing.	Train employees; implement halal SOPs; consistent halal branding.
Check	Monitor halal compliance across value chain.	Conduct audits; verify suppliers; collect consumer feedback.
Act	Continuous improvement in halal practices.	Revise SOPs; innovate in product development and halal packaging.

Source: Author's field survey and stakeholder interviews (2025).

Figure 1, Plan-Do-Check-Act (PDCA) is a four-step management cycle for continuous improvement of processes and products, also known as the Deming Cycle or Shewhart Cycle. These steps include planning objectives, testing activities, implementation, reviewing results, and evaluation. PDCA is essential for making significant changes or repeating the cycle if unsuccessful. It provides an interactive framework for problem-solving and efficiency improvement. PDCA's primary function is also to foster continuous innovation or encourage continuous improvement in quality and efficiency. Problem-solving involves identifying and testing root causes.

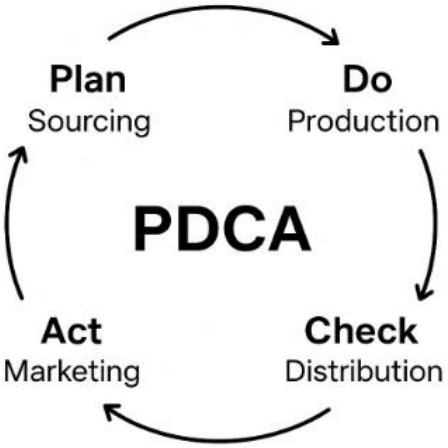

Figure 1. Conceptual PDCA-HVC Model for Food MSMEs in Bali

Stakeholder validation, involving representatives from halal certification bodies, local government, and academia, indicated that the model is practical and adaptable for Bali's multicultural MSME context. This finding aligns with Deming's (1986) principles of continuous improvement and emphasizes that halal management should be treated as an iterative process rather than static compliance.

By positioning halal as a cycle of improvement, this framework also addresses the concern raised by Wilson and Liu (2010) that halal often functions as a mere marketing symbol rather than an operationalized assurance system. The PDCA-HVC model reframes halal as a management tool that enhances product quality, trust, and competitiveness in global halal markets.

DISCUSSION

The results demonstrate that halal adoption among Bali's MSMEs is constrained by structural, cultural, and institutional factors. At the Plan stage, the lack of a strategic roadmap reflects limited awareness of halal as a business driver. This finding is consistent with Kristiana et al. (2022), who argued that managerial commitment is the strongest predictor of halal readiness. In Bali, where halal is not perceived as a cultural norm, MSMEs tend to view halal certification reactively rather than proactively. In contrast, in Malaysia, strong government facilitation through halal industrial parks and structured certification incentives has enabled SMEs to integrate halal into their strategic planning (Talib & Johan, 2012; Karia & Asaari, 2016).

At the Do stage, MSMEs equate halal practices with hygiene, without recognizing its broader religious and ethical dimensions. Similar misconceptions have been observed in other non-Muslim-majority contexts (Ab Talib & Hamid, 2014; Soon et al., 2017). The absence of employee training further weakens implementation, making halal integration dependent on individual owners' awareness rather than institutionalized routines. By comparison, Thailand's government-led "Kitchen of the World" initiative institutionalizes halal training and capacity building across food clusters, enabling SMEs to embed halal assurance into daily operations (Lever & Miele, 2012). The Check stage shows the weakest performance, where supplier verification and consumer feedback mechanisms are nearly absent. This gap mirrors findings by Rulita et al. (2025), who emphasized that resource constraints often prevent MSMEs from conducting regular audits. Without monitoring mechanisms, the integrity of the halal value chain cannot be guaranteed, creating risks of cross-contamination or consumer distrust. In Malaysia, however, systematic halal audits and centralized traceability platforms help SMEs ensure compliance at every stage of the value chain (Ngah et al., 2017).

At the Act stage, most MSMEs perceive halal certification as an endpoint rather than part of a continuous improvement cycle. This mindset undermines the potential of halal as a driver for innovation, branding, and market expansion. Prior studies highlight that halal should be reframed not merely as compliance but as a value-creation mechanism in global markets (Wilson & Liu, 2011; Tieman, 2015). The proposed PDCA-HVC model addresses these gaps by embedding halal principles into a continuous quality management framework. Unlike static

certification, this model positions halal as a dynamic process of planning, implementing, monitoring, and improving. Stakeholder validation further confirms its practicality for Bali's MSMEs, where informal business practices dominate and institutional capacity remains limited.

From a theoretical perspective, this study contributes by integrating the PDCA cycle—a universal quality management tool (Deming, 1986; Moen & Norman, 2010)—with the halal value chain framework, thus providing a structured pathway for MSMEs in non-Muslim-majority contexts. Practically, it offers a replicable model that policymakers and certification bodies can use to strengthen halal ecosystems beyond Muslim-majority settings.

CONCLUSION

This study has examined the implementation of halal value chain (HVC) practices among food MSMEs in Bali, a non-Muslim-majority region, and proposed an integrated PDCA–HVC model to strengthen halal adoption. The findings indicate that while awareness of halal principles is relatively high, operational readiness remains weak, with most MSMEs lacking systematic planning, structured implementation, and monitoring mechanisms.

The proposed PDCA–HVC model addresses these gaps by embedding halal compliance into a continuous quality improvement cycle. By combining the halal value chain with the PDCA framework, the model offers a structured yet flexible roadmap that can guide resource-constrained MSMEs toward gradual compliance and improvement. This approach not only supports halal assurance but also positions halal as a potential driver for innovation, branding, and market expansion.

From a theoretical perspective, this study contributes by integrating a universal quality management tool with halal supply chain scholarship, an area rarely explored in non-Muslim contexts. Practically, it provides a scalable framework for MSMEs, policymakers, and certification bodies to foster inclusive and sustainable halal ecosystem development. Future research could extend this model to other industries, rural–urban contexts, and examine its impact on consumer trust dynamics.

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