

ANALYZING THE IMPACT OF SYSTEMS, HUMAN CAPITAL, AND ANTI-BRIBERY PRACTICES ON BUSINESS SATISFACTION: THE CASE OF HALAL CERTIFICATION IN INDONESIA

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ABSTRACT

Maintaining good service quality in halal certification procedures has become crucial as the demand for halal products grows globally. Focusing on Indonesia, this study investigates the relationship between firm satisfaction with halal certification services and support systems, human capital, and anti-bribery practices. The study uses Structural Equation Modelling (SEM) and the SERVQUAL framework to analyze survey data from 2,367 businesses with halal certifications in 32 Indonesian provinces. The aim is to reveal the determinants of satisfaction and the impact of institutional performance on service delivery. The findings demonstrate that employees with responsiveness, empathy, assurance, and good communication significantly improve not only the perceived quality of services but also the efficacy of anti-bribery initiatives. Meanwhile, support systems that enhance employee performance and customer satisfaction include sufficient equipment, transparent quality control, and complaint procedures. These findings highlight that integrity and professionalism are just as important as technical systems to make certification successful. This study provides insights for certifying organizations and legislators in formulating strategies to boost the competitiveness of Indonesia's halal market, increase efficiency, and build confidence. Strengthening institutional capacity and reducing bureaucratic barriers can help ensure a more reliable and business-friendly certification ecosystem.

Keywords: Halal certification, Service quality (SERVQUAL), Small enterprises, Business satisfaction, Human capital, Bribery.

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I. INTRODUCTION

Indonesia, as the world's largest Muslim-majority country, has a high demand for halal products (Widiastuti et al., 2024). The concept of halal is deeply rooted in Islamic teachings, which set clear guidelines on permissible food, lifestyle, and behavior as prescribed in the Al-Quran (Badrudin et al., 2012). Even in minority-Muslim countries, Halal lifestyles are gaining traction (Septiarini et al., 2023). In Muslim-majority countries like Malaysia and Indonesia, certification is led by the government to ensure compliance with halal regulations (Shuhaimi et al., 2025). The application of the halal concept in the certification relies on collaboration with local religious authorities (Darmalaksana, 2023) and is managed by governmental or non-governmental institutions.

Indonesia's Halal Product Assurance Organizing Agency (*Badan Penyelenggara Jaminan Produk Halal - BPJPH*) oversees halal certification, while the Indonesian Ulema Council (*Majelis Ulama Indonesia - MUI*) provides fatwas for the process. BPJPH works with the National Standardization Agency (*Badan Standardisasi Nasional - BSN*) to implement halal product standards, targeting sectors like medical drugs, food, and cosmetics. Improving halal certification can boost recognition of Indonesian halal certifications from other Muslim-majority countries (Tazlia et al., 2023). This is important because certifications by private bodies often lack cross-border recognition (I. A. Latif et al., 2014).

BPJPH's efforts include improving human capital, expanding access, and upgrading facilities to enhance the effectiveness of halal-certified products. To address disparities in access and facilities (Ismail, 2023), BPJPH conducts community campaigns, business awareness training programs, and auditor training and certification (Wardani & Sukirman, 2024). Thus, it is necessary that BPJPH assesses whether these initiatives have improved business actors' satisfaction, particularly regarding service quality and efficiency. Past studies show that gaps in infrastructure, resources, and procedures may undermine BPJPH's halal certification credibility (Nazaruddin et al., 2025; Sidarto & Hamka, 2021).

This study tests several hypotheses concerning business satisfaction with BPJPH services. First, it examines BPJPH's management system and tangible resources in achieving business satisfaction. Second, it evaluates the effect of BPJPH's anti-bribery management system on satisfaction. And third, it assesses whether BPJPH's systems and human capital can increase overall satisfaction. This evaluation is crucial for optimizing strategies and ensuring Indonesia's halal certification effectiveness.

This study employs the service quality (SERVQUAL) method to assess the perceived quality of BPJPH's services, widely used to assess consumer satisfaction (Farrag et al., 2022; Liu et al., 2015; Owusu-Kyei et al., 2023). Reliability, responsiveness, assurance, empathy, and tangible assets are key service quality components that significantly impact consumer satisfaction (Van Iwaarden et al., 2003; Fida et al., 2020). Similarly, improving satisfaction with the halal certification process requires improvements in service quality. Satisfaction can be improved through a well-structured, efficient system and adequate resources, as they contribute to transparent processes that meet business expectations (Khan et al., 2019; Lestari et al., 2023). However, no study has thoroughly examined how these factors contribute to satisfaction among halal certification applicants in Indonesia.

This study is important because policies mandating industry compliance with halal and safety standards are set for broad implementation by the end of 2024 (Nazaruddin et al., 2025). However, BPJPH continues to face challenges in delivering high-quality services due to resource constraints (Lestari et al., 2023), lengthy processes (Susanty et al., 2024), and widespread bribery (Salama & Chikudate, 2021). Improving human capital, such as employees' skills and competencies, is critical for enhancing consumer satisfaction (Amin et al., 2017). Competent personnel can manage certification processes, provide better services, and minimize errors, leading to higher satisfaction (Setapa et al., 2020). A robust anti-bribery management system also ensures integrity and fairness (Hanindita et al., 2021).

The empirical framework incorporates three key constructs to assess businesses' perceptions and satisfaction with BPJPH's halal certification process. The first construct covers facilities, instruments, equipment, complaint handling, and quality control, evaluating respondents' perceptions of BPJPH's management system and service components. The second construct examines how managers view BPJPH's anti-bribery system, including procedural fairness (giving equal treatment to all customers), ethical conduct (upholding honesty), and integrity assurance (refusing bribery, gift-giving, or extortion). The third construct, personnel competence, looks into empathy, reliability, communication, assurance, and responsiveness.

The food industry, which accounts for the bulk of halal certification applications, is the focus of the study. It collected information from 2,367 certified businesses in 32 Indonesian provinces, including SMEs and large businesses in various industries. The Structural Equation Model (SEM) is employed to examine how management systems, anti-bribery practices, and personnel competence influence business satisfaction. SEM is suitable for this study as it can account for measurement errors and validate latent constructs (Ascarya & Tekdogan, 2022), which is a critical advantage when working with perceptual data from multi-sectoral respondents.

This study offers novelty in four ways. First, considering Indonesia's sizable Muslim population and BPJPH's rapid institutional development in halal certification, the large sample of respondents is pertinent. Second, this study takes into account human capital and the anti-bribery system, whereas the majority of studies just look at management systems and physical elements to assess business satisfaction. These elements are important because perceptions of BPJPH's service quality may also be influenced by ethical standards and operational integrity. Ethics and integrity could be at risk because halal certification is mandatory, yet BPJPH's geographical coverage and resources are limited (Md Nawi et al., 2023; Sudarsono et al., 2024). Under this condition, corruption, including unethical behaviour, fraud, and certificate misuse, may surface (Butt et al., 2021; Dashti et al., 2024; Islam et al., 2023). Third, the study evaluates both tangible and intangible factors, along with transparency, in measuring satisfaction.

Fourth, the research enhances methodological rigor by analyzing two different applicant groups: those seeking certification for the first time and those applying for renewals. This comparative approach reveals varying experiences and expectations in dealings with BPJPH (Tohe et al., 2021). To test our hypothesis

across two different business groups, we use multi-group analysis and look into unobserved heterogeneity. While those looking for extensions are more concerned with efficiency, consistency, and process improvements over time, new applicants typically concentrate more on comprehending the standards for halal certification.

II. LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1. Literature Review

2.1.1. The Halal Concept

Halal, which means “permissible” or “lawful”, is essential to Muslim life and encompasses various aspects, such as food and finances (Bonang et al., 2025), cosmetics (Septiarini et al., 2023; Wilson & Liu, 2010), and pharmaceuticals (Rahem et al., 2021). Globally, the idea of halal has transcended religion and impacted consumer preferences and business practices (Amanda & Santosa, 2024). Halal standards across industries and countries have become more important, despite their initial focus on food preparation in Muslim-majority countries (Koeswinarno et al. 2023).

Standards for halal certification differ from nation to nation and are not globally consistent (Akbar et al., 2023). This impedes international trade as halal certification in one country may not be valid in another (Abdallah, 2021). Different interpretations of halal across cultures and legal systems create confusion in standards and certifications (Shuhaimi et al., 2025). Nonetheless, halal certification’s growing importance pushes companies to certify and governments to strengthen oversight bodies (Annabi & Ibidapo-Obe, 2017).

While halal certification is mandatory in certain Muslim-majority countries and not in others (Bachtiar et al., 2024), certification bodies ensure products comply with Sharia standards and maintain integrity in the halal marketplace (Bonang et al., 2025; Silalahi et al., 2022). Malaysia and Indonesia lead in halal standards and certifications, playing central roles in developing the global halal industry (Tohe et al., 2021; Susanty et al., 2022). Indonesia has incorporated halal standards into its national economic framework, positioning itself for global leadership in the halal industry (Tohe et al., 2021). By aligning Islamic guidelines with global standards, these agencies help standardize and internationalize halal products (Susanty et al., 2022).

2.1.2. Business Actors

Business actors in the halal ecosystem include all entities, including BPJPH and certification bodies. They ensure products meet halal standards and protect consumer interests (Silalahi et al., 2022). Integrity and transparency among these actors are critical, as consumers depend on these assurances for halal products and services (Md Nawi et al., 2023). Failure to comply with halal standards can erode consumer trust and damage business reputation (Usman et al., 2022). A halal supply chain fundamentally depends on mutual trust and commitment among all partners (Supian & Abdullah, 2019). Each party bears responsibility for upholding integrity throughout the supply chain (Butt et al., 2021).

Halal commitment and compliance can be evaluated through two methods. First, Sharia-based auditing examines the applicant's profile, documentation, ingredients, processing, storage, packaging, labeling, equipment, and distribution (Silalahi et al., 2022). Second, technical auditing examines waste management, treatment systems, buildings, and premises. Othman et al. (2016) highlight how knowledge and attitudes influence halal compliance. Research links these factors with commitment and operational readiness in halal-certified firms (Rahem et al., 2021), revealing both internal (Jannah & Al-Banna, 2021) and certification-related external challenges (Khan et al., 2019; Zainuddin et al., 2023).

In Indonesia, MSMEs dominate the halal food and beverage markets (Lestari et al., 2023) but struggle with certification due to strict standards, limited expertise, weak management support, and resource constraints (Abdul Halim et al., 2024; Prabowo et al., 2015). High costs and procedural complexities further hinder compliance (Adekunle & Filson, 2020). However, as global demand grows, certified firms gain a competitive edge, with consumer trust driving the need for halal certification to expand market access (Usman et al., 2022; Widiastuti et al., 2024).

2.2. Hypothesis Development

Among various analytical models for assessing business satisfaction, SERVQUAL emerges as the most empirically validated framework (Zainuddin et al., 2023). This model measures the gap between actual and expected service performance (Farrag et al., 2022), providing certification bodies and policymakers with valuable insights into service alignment with business expectations (Asnawi et al., 2020).

The competency and professionalism of certification body personnel significantly impact satisfaction with halal certification services (Noor, 2025). Five key service quality dimensions—empathy, responsiveness, assurance, communication, and reliability—determine human capital effectiveness in delivering superior experiences. These dimensions, operationalized in the SERVQUAL model (Lewis & Mitchell, 1990), are defined as follows: (1) empathy: understanding and addressing unique customer needs (Fida et al., 2020), (2) reliability: consistent and accurate service delivery (Noor, 2025), (3) communication: clear information exchange through responsive channels (Albuali, 2021), (4) assurance: demonstrated competence and trustworthiness (Van Iwaarden et al., 2003), (5) responsiveness: timely resolution of certification issues (Fida et al., 2020; Idayati et al., 2020).

These dimensions are particularly critical where ethical integrity and process transparency are paramount in business-certifier engagements (Wilson & Liu, 2010). Interpersonal competencies, especially clear communication and empathy, significantly enhance satisfaction (Badruldin et al., 2012). Reliability and professional assurance not only build trust in certification but also reinforce halal standards compliance (Badruldin et al., 2012). Equally crucial is responsive, needs-based service delivery, which optimizes satisfaction throughout the certification process (Noordin et al., 2014). In essence, the competence of certification body personnel directly enhances business satisfaction by streamlining certification and fostering confidence (Ratnawati & Kholis, 2020; Zainuddin et al., 2023).

Hypothesis (H1): *Human capital has a positive influence on business satisfaction with halal certification*

Anderson et al. (2024) state that the difference between expected and perceived service quality serves as the basis for an affective assessment of customer satisfaction that ranges from delight to disappointment. In halal certification, customer expectations rely on certification process management and service quality (Amanda & Santosa, 2024). As societal needs evolve, continuous service innovation becomes important (Truong et al., 2020). To maintain consistent standards, meet international benchmarks, and uphold compliance, transparency, and integrity, halal certification bodies require a strong management system (Bonang et al., 2025; I. A. Latif et al., 2014).

The physical characteristics of a certifying body's facility, such as its cleanliness, organization, and operating orderliness, demonstrate its professionalism (Cox & Dale, 2001). These tangible assets and infrastructures could support or hamper halal certification (Susanty et al., 2024; Khan et al. 2019). Additionally, studies have revealed that Indonesian companies are generally unhappy with the infrastructure that is currently in place, highlighting the necessity for upgrades (Lestari et al., 2023). A strong management system must be paired with appropriate facilities to guarantee operational effectiveness and customer trust (Idayati et al., 2020).

Hypothesis (H2): *Tangible assets with a robust management system positively influence business satisfaction with halal certification.*

A strong anti-bribery management system does more than just prevent corruption—it builds trust in halal certification by ensuring transparent, integrity-driven operations (Paik et al., 2019). When certification bodies eliminate corruption risks, they don't just follow rules—they earn customer confidence (Dashti et al., 2024; Supian & Abdullah, 2019). Critically, these would guarantee equitable treatment for all applicants, creating a level playing field in certification processes (Malega & Majernik, 2024).

In today's competitive market, fairness is not just ethical; it is a strategic advantage that sets trustworthy certifiers apart (Soltanian et al., 2016). Businesses actively seek out certification bodies with rigorous anti-bribery systems because they guarantee merit-based decisions and reduce uncertainty (Ragazou et al., 2022). Systems like Malaysia's Halal Assurance System (HAS) prove how standardized processes, when combined with anti-corruption measures, create consistency and reliability (Tarmizi et al., 2014). This results in greater satisfaction among certified businesses and stronger confidence in halal authenticity (Yun, 2021).

Hypothesis (H3): *An anti-bribery management system has a positive influence on business satisfaction with halal certification.*

An effective anti-bribery system depends on human capital, e.g., behavior, knowledge, and skills. As Masters (2018) shows, personnel awareness of human behavior determines system effectiveness, while their competence directly reflects an organization's ethical commitment and transparency (Dutta et al., 2022).

An integrated Governance, Risk Management, and Compliance (GRC) plan, which depends on qualified personnel to avoid corruption within organizations, is deemed an appropriate strategy by Masters (2018) and Siahaan et al. (2023). To organize the framework, it is essential to have competent staff to organize the framework. Le et al. (2021) also highlight the significance of ethical leadership and

organizational structure (internal controls). However, without sufficient human capital that respects moral principles, this strong internal control mechanism cannot function (Alam et al., 2019). To improve integrity standards, personnel can participate in global anti-corruption campaigns (Paik et al. (2019), for example, in Scandinavia, where integrity management and transparency are highly regarded.

These demonstrate how organizational competency and culture molded by knowledgeable, moral staff are essential in initiatives to reduce corruption, supporting the idea that human capital plays a significant role in anti-bribery (Dutta et al., 2022)

Hypothesis (H4): *Human capital positively influences the effectiveness of an anti-bribery management system.*

To guarantee continuous certification activities, a strong management system is needed. Halal integrity (IHL) is greatly impacted by corporate image and reputation (CRE) and corporate social responsibility (CSR) because they promote confidence and guarantee excellent certification services (Susanty et al., 2022). In addition, to carry out efficient evaluations, physical infrastructure and resources, such as modern instruments, furnished labs, office buildings, and sophisticated IT infrastructure, are essential (Fida et al., 2020; Van Iwaarden et al., 2003).

Inadequate infrastructure and labor are major causes of China's certification organizations' poor performance, underscoring the necessity of having enough resources to guarantee successful certification (Liu et al., 2015). Idayati et al. (2020) confirm the impact of service quality, examining dimensions such as tangible elements, empathy, reliability, responsiveness, and assurance. The service quality of certifying organizations is positively impacted by strong management systems and tangible resources, which boosts satisfaction and trust.

Hypothesis (H5): *A robust management system and its tangible components positively influence service quality.*

Table 1 summarizes the main research hypotheses, outlining the theoretical basis and key literature supporting them.

Table 1.
Empirical and Theoretical Foundations of Research Hypotheses

Hypothesis	Description	Supporting References
H1	Human capital positively influences business satisfaction	Noor (2025); Badrudin et al. (2012); Fida et al. (2020); Gayatri et al. (2024); Zainuddin et al. (2023)
H2	Tangible assets and robust management system positively influence satisfaction	Susanty et al. (2024); Khan et al. (2019); Lestari et al. (2023); Idayati et al. (2020); Bonang et al. (2025)
H3	Anti-bribery management system positively influences satisfaction	Tieman (2020); Dashti et al. (2024); Supian & Abdullah (2019); Yun (2021); Malega & Majernik (2024)
H4	Human capital strengthens anti-bribery system	Masters (2018); Dutta et al. (2022); Le et al. (2021); Alam et al. (2019); Siahaan et al. (2023)
H5	System and support enhance human capital and service quality	Liu et al. (2015); Idayati et al. (2020); Fida et al. (2020); Van Iwaarden et al. (2003)

III. DATA AND INSTRUMENT DEVELOPMENT

3.1. Data

The data are compiled through a structured survey targeting business actors who applied for halal certifications between 2019-2021. Survey respondents are selected using purposive sampling to ensure representation of firms across business scales, certification types (new or renewal), financing sources, locations, certification management approaches (independent versus association/third-party), director demographics (age, gender), and firm age. The sample is drawn proportionally across 32 provinces in Indonesia to align with the distribution of halal-certified firms across regions. Though total sample size is determined using the Krejcie and Morgan formula for statistical reliability, purposive sampling is used to ensure representation across key characteristics of halal-certified firms (size, certification type, and geography).

Contact information of surveyed firms is sourced from a halal certification applicant database. The data are anonymized with respondent consent. The sample size calculation uses the standard formula, considering a 2% margin of error, population proportion of 0.5, and a 95% confidence level Z-score of 1.96. This formula accounts for population variability and finite population correction, determining a target sample size for statistical reliability and generalizability. Surveying a minimum of 2,000 businesses would provide the desired precision and confidence. Data from 2,367 Indonesian firms are finally compiled through an electronic questionnaire across 32 provinces, covering various sectors, including food, beverages, processing, drugs, slaughter, packaging, cosmetics, sales, chemicals, consumer goods, storage, distribution, and biological products.

3.2. Method

This study uses PLS-SEM to analyze the proposed empirical framework. PLS-SEM uses a variance-based approach, as introduced by Hair et al. (2012), integrating principal component analysis with path analysis techniques (W. Wang & Chang, 2005). Through principal component analysis, we can analyze linear relationships between latent constructs and real variables (Chin et al., 2003). The prediction-focused nature, sample size, and potential non-normality in the data (Wong, 2013) make PLS-SEM appropriate to test our model. Moreover, PLS is particularly well-suited for exploratory research aiming at theory development (Ascarya & Tekdogan, 2022; Yusfiarto et al., 2022).

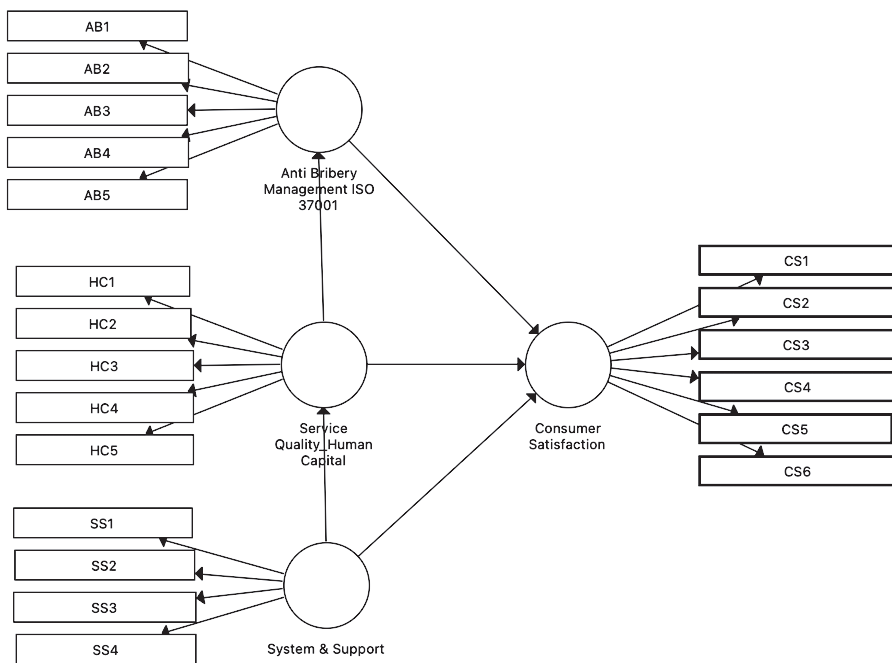
PLS-SEM is particularly valuable for causal predictive analysis in complex, theory-limited contexts (Ascarya & Tekdogan, 2022). This flexible method accommodates theoretical and measurement conditions, distributional characteristics, and practical considerations (Barclay et al., 1995). Its strength in analyzing perception-based survey data (J. F. Hair et al., 2012) makes it ideal for evaluating our empirical model. Following Henseler et al. (2009), we implement a two-step procedure to assess both the outer measurement and structural models.

3.3. The Proposed Model

The survey employs a 4-point Likert scale (1="poor" to 4="very good") adapted from validated frameworks to ensure measurement reliability (Lestari et al., 2023; Md Nawi et al., 2023). The constructs are built based on empirical studies, incorporating administrative and bureaucratic dimensions relevant to service delivery and quality in Indonesia.

The Consumer Satisfaction construct evaluates business perceptions across six dimensions: clarity of certification requirements (Requirements), quality of information provided (Information), process transparency and efficiency (Procedures), service timeliness (Time), cost affordability (Cost), and overall service quality (Perceived Quality) measured through accuracy, efficiency, effectiveness, and standards compliance. These indicators aim to capture comprehensive business experience, highlighting areas where needs are met or improvements are needed.

The Human Capital Capabilities construct assesses certification personnel across five dimensions: empathy in understanding business concerns (Empathy), reliability in service delivery (Reliability), clarity of communication (Communication), professional competence (Assurance), and promptness in addressing needs (Responsiveness). These dimensions provide a comprehensive evaluation of personnel effectiveness in halal certification processes.



Source: Author's work

Figure 1.
Framework for Business (Consumer) Satisfaction

The System and Support construct is measured through indicators assessing the quality and adequacy of systems and resources supporting certification. While Complaint Handling assesses procedures to resolve business issues, Quality Control concentrates on systems to guarantee compliance with certification standards. Equipment and Instruments, and Physical Facilities assess the availability and quality of infrastructure supporting certification. These indicators measure the agency’s capacity to uphold standards and meet business needs efficiently.

The Anti-Bribery Management construct is assessed through five indicators of ethical conduct during certification. No Intermediation measures the directness of certification, ensuring no unnecessary intermediaries that can corrupt the process. Equal Treatment assesses whether businesses are treated fairly without bias. Honesty evaluates transparency in interactions. No Bribes or Gifts measures adherence to anti-bribery policies. No Extortion affirms businesses are not subjected to unethical demands. Together, these elements assess the ethical climate of the certification body, reinforcing trust and fairness.

IV. RESULTS

4.1 Respondents’ Descriptive Statistics

The survey covers 2,637 halal-certified businesses across 32 Indonesian provinces (Table 2). Most respondents are female (71%) and age over 41 (60%). The majority apply for new certifications (86%) and operate micro-sized enterprises (88%). Certification is mostly self-managed or assisted by third parties, with 77% receiving government funding. Over half of the businesses (52%) has been operating for 2–5 years. The food sector dominates (75%), followed by beverages (17%), with fewer from cosmetics, slaughtering, packaging, and chemicals.

Table 2.
Characteristics of Survey Respondents (Business Representatives)

	N	(%)		N	(%)
Gender			Certificate Status		
Male	680	29.7%	New	2044	86%
Female	1687	71%	Extension	323	14%
Age Group			Business Age		
Less than 17	4	0.2%	Less than 2 years	268	11%
18 – 24	46	1.9%	2 to 5 years	1231	52%
25 -40	905	38.2%	2 to 5 years	487	21%
Over 41	1412	59.7%	More than 10 years	381	16%
Certification Management			Business Size (Annual Revenue)		
Self-manage	1005	43%	Micro (< IDR 300 million)	2093	88%
Agent/Consultant Services	56	2%	Small (> IDR 300 million < 2.5 billion)	201	9%
Association	278	12%	Medium (> IDR 2.5 billion < 50 billion)	44	2%
Other Parties’ Assistance	1028	43%	Large (> IDR 50 billion)	29	1%

Table 2.
Characteristics of Survey Respondents (Business Representatives) (Continued)

	N	(%)		N	(%)
Method of Application			Business Sector		
Online	837	35.4%	Food	1772	74.9%
Offline	1530	64.6%	Beverages	399	16.9%
			Slaughtering	15	0.6%
Funding Source			Packaging	13	0.5%
Self-funded	371	15.7%	Cosmetics	12	0.5%
Government	1818	46.8%	Distribution	10	0.4%
Other Parties	178	7.5%	Chemical	5	0.2%
			Others	141	5.9%

4.2. Results

4.2.1. Measurement Model Results

The PLS-SEM measurement model follows Hair Jr et al. (2014), with a focus on internal consistency, indicator reliability, convergent validity, and discriminant validity.

First, we assess the model's reliability and validity (Table 3). Internal consistency reliability is evaluated using Composite Reliability (CR), with an acceptable threshold of >0.70 (F. Hair Jr et al., 2014). The CR values for all constructs range from 0.895 to 0.951, indicating strong reliability. Hair et al. (2017) also suggest evaluating with Cronbach's Alpha (CA), recommending a threshold of >0.70 , or >0.60 in some cases (J. Hair et al., 2017). The CA values range from 0.859 to 0.935, aligning with the standards. The rho_A value, exceeding 0.70, range from 0.864 to 0.936, as shown in the CR and Validity table.

Indicator reliability is assessed using outer loadings, with values above 0.70 considered strong (Hair Jr et al., 2014). Most indicators meet this threshold (Table 3). However, one indicator (CS5) has a lower loading of 0.677 but is retained as it exceeds the 0.6 minimum, and removing it does not significantly improve the CR value. Next, convergent validity is assessed using Average Variance Extracted (AVE), where the AVE values exceeding 0.50 means that the constructs explain more than half of their indicators' variance (Chin, 1998; J. F. Hair et al., 2019; Henseler et al., 2009; Hock et al., 2010). Discriminant validity is supported by Fornell-Larcker Criterion results with each AVE square root exceeding inter-construct correlations (J. Hair et al., 2017), as shown in panel A of Table 4. Additionally, the Heterotrait-Monotrait Ratio (HTMT) test in panel B shows all ratios below 0.9 (Henseler et al., 2015).

Table 3.
Construct reliability and Validity

Construct / Indicator		Outer Loading	Definition
Code	Consumer Satisfaction (CA: 0.859; Rho_A: 0.864; CR: 0.895; AVE 0.589)		
CS1	Requirements	0.791	Satisfaction with ease of certification requirements
CS2	Information	0.795	Ease of accessing certification information
CS3	Procedures	0.843	Clarity and simplicity of certification steps
CS4	Time	0.747	Speed of certification completion
CS5	Cost	0.677	Reasonableness of certification fees
CS6	Perceived Quality	0.741	Accuracy of certification results (accuracy, efficiency, effectiveness, adherence to standards)
Human Capital Capabilities (CA: 0.897; Rho_A: 0.900; CR: 0.924; AVE 0.708)			
HC1	Empathy	0.830	Staff politeness and friendliness
HC2	Reliability	0.858	Staff punctuality in delivering services on time
HC3	Communication	0.846	Staff ability to communicate clearly (verbally and in writing)
HC4	Assurance	0.834	Satisfaction with the opportunity to submit complaints or suggestions
HC5	Responsiveness	0.840	Satisfaction with how complaints and feedback are handled
System & Support (CA: 0.877; Rho_A: 0.880; CR: 0.915; AVE 0.730)			
SS1	Quality control	0.874	System that ensures services meet established quality standards
SS2	Complaint Handling	0.857	Chance to give suggestions/complaints. Response to feedback and complaints.
SS3	Equipment and instruments	0.840	Availability of tools (e.g., computers)
SS4	Physical Facilities	0.847	Adequacy of buildings and waiting areas
Anti-Bribery Management ISO 37001 (CA: 0.935; Rho_A: 0.936; CR: 0.951; AVE 0.794)			
AB1	No intermediation	0.897	Fair service is provided directly without requiring unofficial intermediaries
AB2	Equal_treatment	0.845	All applicants are treated fairly and without discrimination
AB3	Honesty	0.886	Staff act with integrity and provide truthful information
AB4	No Bribes or gifts	0.915	No expectation or request for bribes or gifts during the process
AB5	No extortion	0.913	No pressure or coercion to make payments outside official requirements

Note. Cronbach's Alpha (CA); Rho_A; Composite Reliability (CR); Average Variance Extracted (AVE)

Table 4.
Discriminant Validity (Fornell-Larcker and HTMT)

	Anti-Bribery Management ISO 37001	Consumer Satisfaction	HR Capabilities	System & Support
Panel A: Fornell-Larcker				
Anti-Bribery (ISO 37001)	0.891			
Consumer Satisfaction	0.532	0.767		
Human Capital Capabilities	0.657	0.709	0.842	
System & Support	0.557	0.739	0.728	0.855
Panel B: HTMT				
Anti-Bribery (ISO 37001)	0.000	0.000	0.000	0.000
Consumer Satisfaction	0.588	0.000	0.000	0.000
Human Capital Capabilities	0.717	0.800	0.000	0.000
System & Support	0.611	0.847	0.815	0.000

4.2.2. Structural Model Results

After confirming the adequacy of the measurement model, the evaluation proceeds through three steps: multicollinearity assessment, coefficient of determination, and predictive relevance.

A multicollinearity test checks whether correlations exist between constructs, as this can lead to biased conclusions and interpretations (F. Hair Jr et al., 2014). Multicollinearity is assessed using the variance inflation factor (VIF), with most values below the 4.0 threshold (Garson, 2016) (see Table 5. VIF). A few indicators—AB1 (4.241), AB4 (4.692), AB5 (4.611), and AB3—slightly exceed it, but remain under the critical limit of 5, indicating no serious multicollinearity concerns and allowing further model evaluation. Chennamaneni et al. (2016) note that a VIF of less than 5 indicates a low predictor correlation, confirming multicollinearity is not a major concern and model assessment can proceed.

Table 5.
VIF

Variable	VIF	Variable	VIF	Variable	VIF	Variable	VIF
CS1	1.937	AB1	4.241	HC1	2.333	SS1	2.545
CS2	1.964	AB2	2.581	HC2	2.550	SS2	2.405
CS3	2.384	AB3	3.166	HC3	2.658	SS3	2.321
CS4	1.678	AB4	4.692	HC4	2.560	SS4	2.359
CS5	1.461	AB5	4.611	HC5	2.162		
CS6	1.571						

The coefficient of determination (R^2) shows how much variance in an endogenous construct is explained by exogenous variables. R^2 values of 0.25, 0.50, and 0.75 reflect weak, moderate, and substantial predictive accuracy, respectively (J. Hair et al., 2017). In this study (Table 6), the R^2 for Consumer Satisfaction, System and Support, and Anti-Bribery (ISO 37001) suggests moderately explanatory

power, namely, 61%. Nevertheless, R^2 reflects only on-sample explanatory power. To assess out-of-sample prediction, we apply the PLSPredict (Table 8). Given the skewed distribution, the mean absolute error (MAE) is used over RMSE. Results show lower MAE in the PLS-SEM model compared to the benchmark (or naïve model), confirming strong predictive capabilities (Shmueli et al., 2019).

Table 6.
R Square for Consumer Satisfaction

R Square	R Square Adjusted
0.610	0.609

Table 7.
Model Fit

	Saturated Model	Estimated Model
SRMR	0.055	0.055
d_ULS	0.634	0.634
d_G	0.261	0.261
Chi-Square	3821.304	3821.304
NFI	0.890	0.890

Table 8.
Output of PLSPredict

	PLS-SEM	Benchmark	PLS-SEM	Benchmark
	RMSE	RMSE	MAE	MAE
Requirements	0.485	0.485	0.373	0.382
Information	0.492	0.491	0.354	0.355
Cost	0.573	0.573	0.394	0.394
Perceived Quality	0.436	0.435	0.357	0.345
Procedures	0.476	0.476	0.335	0.336
Time	0.596	0.592	0.458	0.463

As for effect size and predicted relevance (Table 9), Cohen's f^2 assesses how much an exogenous variable contributes to the R^2 value (Yusfiarto et al., 2022). An f^2 of 0.02, 0.15, and > 0.35 indicates small, medium, and large effect sizes, respectively (J. Hair et al., 2017). Table 10 shows two relationships with large effects, two medium, and one small. Predictive relevance was tested using Stone-Geisser's Q^2 . The Q^2 value for the consumer satisfaction construct is 0.354, indicating strong predictive accuracy in reconstructing observed values (Yusfiarto et al., 2022).

Table 9.
Effect Size Estimates and Multicollinearity Diagnostics

	F²	VIF
Anti-Bribery ISO 37001 -> Consumer Satisfaction	0.040	1.806
Service Quality_Human Capital -> Anti Bribery ISO 37001	0.764	1.000
Service Quality_Human Capital -> Consumer Satisfaction	0.156	2.649
System & Support -> Consumer Satisfaction	0.256	2.180
System & Support -> Service Quality_Human Capital	1.129	1.000

Table 10.
R² Coefficients and Stone-Geisser's Q² Values

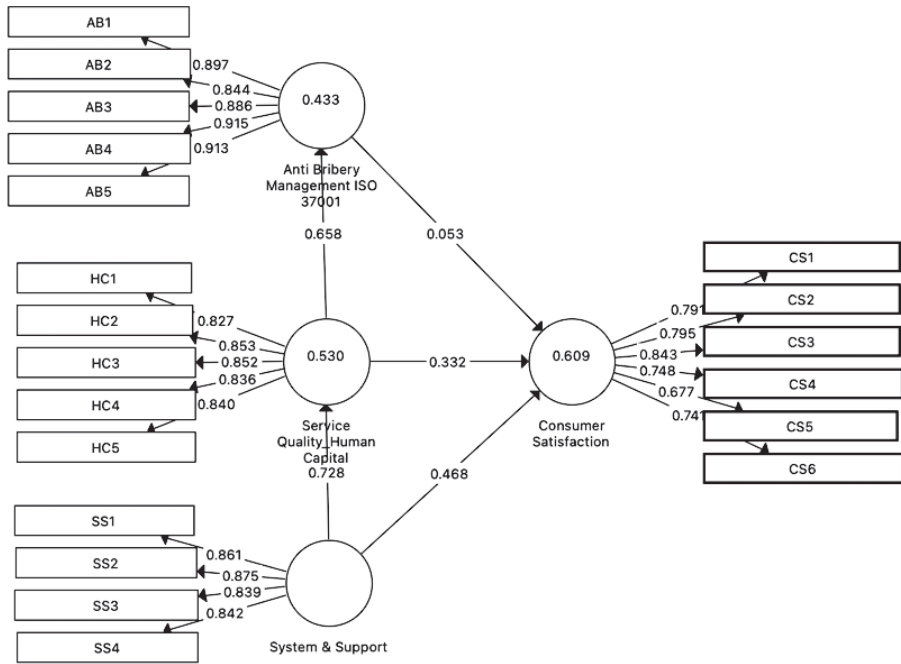
Construct Relationship	SSO	SSE	R2	R2 Adjusted	Q²
Anti-Bribery ISO 37001	11835.000	7820.424	0.433	0.433	0.339
Consumer Satisfaction	14202.000	9176.225	0.609	0.608	0.354
Service Quality_Human Capital	11835.000	7425.986	0.530	0.530	0.373
System & Support	9468.000	9468.000			

After assessing the measurement and structural models, hypothesis testing is performed using bootstrapping with 5,000 resamples and a one-tailed test. Figure 2 presents the PLS Algorithm results. As depicted in Table 11 (Path Analysis), all paths are supported. We note that System Support shows the greatest influence on Consumer Satisfaction.

Table 11.
Path Analysis

Hypotheses			P Values	Validated?
Service Quality_Human Capital -> Consumer Satisfaction	H1	0.332	0.000***	Accepted
System & Support -> Consumer Satisfaction	H2	0.468	0.000***	Accepted
Anti-Bribery ISO 37001 -> Consumer Satisfaction	H3	0.053	0.007**	Accepted
Service Quality_Human Capital -> Anti Bribery ISO 37001	H4	0.658	0.000***	Accepted
System & Support -> Service Quality_Human Capital	H5	0.728	0.000***	Accepted

Note: The p-values in the table indicate statistical significance, with * p < 0.05, ** p < 0.01, and *** p < 0.001.



Source: Author’s work

Note. Numbers on the arrows represent standardized path coefficients. Numbers inside the circles indicate the R² values for the latent variables.

Figure 2.
PLS Algorithm

4.3. Robustness Tests

To ensure the robustness of our model, we assess unobserved heterogeneity, which may arise from hidden subgroups in the sample and bias estimates. Following Sarstedt et al. (2020), we used FIMIX-PLS (Hahn et al., 2002) to detect segmentation and applied Kock & Hadaya’s (2018) guideline of 25-27 segments. After analyzing 10 segments, we found moderate heterogeneity. Although segmentation improved model fit, the entropy and classification indices show no significant latent class distinctions (Table 7). Entropy (EN) ranges from 0.456-0.520, and the Non-Fuzzy Index (NFI) drops to 0.415 in the five-segment model. The normalized entropy criterion reaches its lowest at segment 4 (593) and rises thereafter. Thus, while moderate heterogeneity exists, it is not at a critical level, and the global model remains valid for general interpretation.

To examine potential unobserved heterogeneity, we divided our data into two distinct groups: new applicants and those renewing halal certifications, as these groups may have different service expectations (Tohe et al., 2021). Following K. F. Latif et al. (2024), we utilize Multi-Group Analysis (MGA), including assessment of reliability, validity, determination of coefficients, effect size, and predictive relevance for each group (Table 12). We then evaluate the structural model, analyze path coefficients, and identify significant differences across groups. Due to space constraints, we present only reliability, convergence validity, and key path coefficients (Table 13).

Table 12.
Reliability and Convergent Validity for Groups (MGA)

	All				Extension				New			
	Alpha	CR	AVE	Alpha	CR	AVE	Alpha	CR	AVE	Alpha	CR	AVE
Anti-Bribery Management ISO 37001	0.935	0.951	0.794	0.928	0.946	0.777	0.936	0.952	0.797	0.936	0.952	0.797
Consumer Satisfaction	0.859	0.895	0.589	0.905	0.927	0.680	0.846	0.887	0.567	0.846	0.887	0.567
Service Quality_Human Capital	0.897	0.924	0.709	0.903	0.928	0.721	0.895	0.923	0.704	0.895	0.923	0.704
System & Support	0.877	0.915	0.730	0.900	0.930	0.769	0.872	0.912	0.722	0.872	0.912	0.722

Note. Alpha. Cronbach's Alpha. All (Full Sample), Extension (firms extending certifications), New (new firms applying certifications)

Table 13.
Path Analysis (Robustness Test - MGA)

	All firms				Extension				New			
	B	T	P	B	T	P	B	T	P	B	T	P
Anti-Bribery Management ISO 37001 -> Consumer Satisfaction	0.053	2.971	0.002	* 0.062	1.152	0.125	0.055	2.591	0.005	* 0.055	2.591	0.005
Service Quality_Human Capital -> Anti Bribery Management ISO 37001	0.658	46.133	0.000	* 0.725	22.248	0.000	* 0.646	40.220	0.000	* 0.646	40.220	0.000
Service Quality_Human Capital -> Consumer Satisfaction	0.332	14.092	0.000	* 0.378	4.669	0.000	* 0.318	12.978	0.000	* 0.318	12.978	0.000
System & Support -> Consumer Satisfaction	0.468	22.941	0.000	* 0.443	6.700	0.000	* 0.471	21.764	0.000	* 0.471	21.764	0.000
System & Support -> Service Quality_Human Capital	0.728	64.811	0.000	* 0.788	36.497	0.000	* 0.714	57.074	0.000	* 0.714	57.074	0.000
	R²	Q²		R²	Q²		R²	Q²		R²	Q²	
Anti-Bribery Management ISO 37001	0.433	0.433		0.526	0.524		0.418	0.417		0.418	0.417	
Consumer Satisfaction	0.609	0.608		0.674	0.671		0.592	0.591		0.592	0.591	
Service Quality_Human Capital	0.530	0.530		0.622	0.621		0.510	0.510		0.510	0.510	

* Significant at p < 0.05. B = Beta coefficient; T = t-statistic; P = p-value (probability)

In the MGA, we compare coefficient differences between new applicants and those renewing halal certification, focusing on the link between consumer satisfaction and antibribery, service quality, and system support (Table 14). The findings indicate no notable differences between groups concerning consumer satisfaction. However, notable differences emerge in the relationships between anti-bribery and service quality, and between service quality and system support, both stronger among renewal applicants. Still, since these do not significantly affect consumer satisfaction, the overall model remains a good fit.

Table 14.
Multi-Group Analysis Results

Relationships	Difference (New – Extension)	p-value
Anti-Bribery ISO 37001 -> Consumer Satisfaction	-0.007	0.448
Service Quality_Human Capital -> Anti Bribery ISO 37001	-0.079	0.012*
Service Quality_Human Capital -> Consumer Satisfaction	-0.060	0.236
System & Support -> Consumer Satisfaction	0.028	0.340
System & Support -> Service Quality_Human Capital	-0.074	0.002*

* Significant at $p < 0.05$;

4.4. Analyses/Discussions

The results indicate that all path coefficient values are accepted (p -value < 0.05), meaning that three aspects, namely, Human Capital, System and Support, and Anti-bribery, play a significant role in enhancing Consumer Satisfaction. These findings align with previous research that highlights the crucial role of these factors in influencing consumer satisfaction.

The results of the path analysis (Table 11) demonstrate a positive and significant relationship between Service Quality and Human Capital of the certifying halal agencies with consumer satisfaction ($H1: B = 0.332, t = 12.953, p = 0.000$). Human capital is central to improving consumer satisfaction, particularly in the halal industry, where religious and cultural values shape expectations. The quality of personnel—empathy, reliability, communication, assurance, and responsiveness—significantly influences business satisfaction with the certification process. These attributes help create a smoother, more supportive, and trustworthy experience, leading to higher overall satisfaction.

The findings are consistent with Lewis and Mitchell (1990) demonstrating that employee competency plays a critical role in determining how satisfied businesses are with halal certification. The SERVQUAL model states that components related to human capital, such as reliability, responsiveness, assurance, and empathy, are crucial factors in achieving consumer satisfaction, as highlighted by Fida et al. (2020) in the context of Islamic banks. Similarly, Usman et al. (2022) find that customer satisfaction in Indonesia is greatly influenced by the quality of human resources in delivering better and more responsive services.

Additionally, the data show a significant and positive correlation between System and Support and Customer Satisfaction ($H2: B = 0.468, t = 21.306, p = 0.000$). Therefore, it can be said that management and tangible components

like equipment, buildings, and staff members' actual presence are essential for improving the quality of services provided by certifying bodies. Overall operational performance is strengthened when effective management techniques and sufficient physical resources work together.

Customer satisfaction, which is frequently assessed using the SERVQUAL model, is greatly influenced by service quality (Bowen et al., 2023). The results of this study support the hypothesis and previous research by Cox & Dale (2001). They underscore the importance of creating a positive impression to build clients' trust in halal certification bodies. Our findings align with Zainuddin et al. (2023) on Malaysia's JAKIM certification agency, confirming that effective response management systems are crucial for fulfilling institutional commitments. This is further supported by Lepistö et al. (2024) and Owusu-Kyei et al. (2023), who demonstrate how Total Quality Management (TQM) enhances both consumer satisfaction and corporate reputation through robust support systems.

Our findings support Liu et al.'s (2015) assertion that structured support systems, whether technological or managerial, enhance perceived service quality. Like Khan et al. (2019), we observe these systems build consumer trust through improved experiences. The results empirically validate how robust support helps Indonesian SMEs overcome compliance challenges, aligning with previous studies (Darmalaksana, 2023; Silalahi et al., 2022). Similarly, our findings align with Bachtiar et al. (2024), stating that clear information, tools, assistance, and inspection from certification bodies are crucial to enhancing halal implementation among firms in Indonesia.

Our results demonstrate that ISO 37001 Anti-bribery Management significantly increases Consumer Satisfaction (H3: $\beta = 0.053$, $t = 2.714$, $p = 0.007$), confirming that robust anti-bribery systems enhance halal certification satisfaction. This aligns with existing research in multiple ways. First, it supports Soltanian et al.'s (2016) findings on how certification body reputation fosters business sustainability. Second, it reinforces Masters' (2018) emphasis on GRC frameworks for corruption prevention. Similarly, the results reinforce earlier concerns in Indonesia regarding potential fraudulent and unethical practices that may jeopardize an agency's integrity (Dashti et al., 2024; Islam et al., 2023), while also suggesting that adherence to honest principles enhances perceived consumer satisfaction. The presence of a strong GRC framework ensures good governance and transparency, which directly affects consumer perceptions of a company's integrity, thereby enhancing their satisfaction, as noted by Siahaan et al. (2023).

The analysis reveals a strong direct relationship between Service Quality, Human Capital, and ISO 37001 (H4: $\beta = 0.658$, $t = 42.605$, $p = 0.000$), aligning with Masters (2018) and Siahaan et al. (2023). Their studies demonstrate that human capital enhances anti-bribery system effectiveness, which can enhance integrity in service delivery and strengthen consumer trust. These findings suggest that service quality, when supported by competent human capital, works synergistically with ISO 37001 compliance to anti-bribery contributes to satisfaction.

The results show System and Support on Service Quality_Human Capital are significantly correlated (H5: $B = 0.728$, $t = 66.089$, $p = 0.000$). This suggests that, in line with the findings of Idayati et al. (2020), an efficient support system can significantly improve human capital's contribution to the quality of services. Good

support systems enable staff to provide superior customer service, which will contribute to customer satisfaction. Staff members can better serve the needs of applicants for halal certification if they have the necessary training and resources. Similar to this, Noordin et al. (2014) and Noor (2025) emphasize the increasing importance of systems and support in delivering higher-quality services. A study by Ratnawati & Kholis (2020) on Indonesia's health system (BPJS) also emphasizes the pivotal roles of buildings, staff, equipment, and management in delivering high-quality care.

Overall, the findings show a considerable correlation between Consumer Satisfaction, Human capital, Systems and Support, and Anti-Bribery Management. Each component contributes to a favorable experience for candidates seeking halal certification. Notably, Systems and Support improve service quality provided by staff members (i.e., human capital) and the efficacy of anti-bribery measures, which both indirectly contribute to consumer happiness. Improving these elements increases professionalism and trust, which raises customer satisfaction with halal services.

V. CONCLUSION AND RECOMMENDATION

This study effectively identifies the key elements affecting business satisfaction with Indonesian halal certification services, showing that anti-bribery management, systems and support, and human capital are crucial for raising customer satisfaction. The results demonstrate how trained staff greatly enhance service quality, especially in the areas of responsiveness, assurance, communication, empathy, and reliability. Additionally, a legitimate halal certification system, effective service delivery, and long-term trust are all facilitated by well-developed human resources.

Systems and support, including physical assets like buildings, facilities, and equipment, as well as robust management systems, are essential for improving operational effectiveness and expediting the halal certification procedure. A robust operational infrastructure and streamlined certification processes enable businesses to navigate halal certification more efficiently, enhancing overall satisfaction. When certification bodies combine skilled personnel with effective support systems, they can address applicant needs while maintaining rigorous professional standards throughout the certification lifecycle.

Another important element in guaranteeing transparency and equity in the halal certification procedure is the application of Anti-bribery Management ISO 37001. Businesses that use a system based on moral principles and devoid of unethical behavior typically exhibit higher levels of satisfaction and trust. Additionally, the evidence in this study indicates that this method fosters a competitive, corruption-free halal business and enhances the legitimacy of certifying agencies. This finding provides important new information and useful suggestions for enhancing Indonesia's halal certification system.

The high path coefficient between System and Support and Human Capital indicates that a robust support system greatly improves the quality of services provided by human capital. This improvement can be attributed to strict quality control, effective complaint resolution, and the use of modern tools and technology.

Likewise, complaint resolution raises morale, while regular HR audits guarantee consistent standards. Equipping staff with advanced tools also improves service delivery, showing how infrastructure investments strengthen human capital performance.

The connection between service quality, human capital, and anti-bribery management (ISO 37001) also has key implications. Qualities like empathy, reliability, communication, assurance, and responsiveness reinforce anti-bribery efforts by improving needs assessment, building trust, avoiding disputes, strengthening confidence, and resolving problems efficiently.

This study bridges a critical research gap by investigating applicant satisfaction with halal certification services—an underexplored area despite documented application barriers. While prior work focused on challenges in obtaining certification, few studies have examined service quality determinants. Our findings establish a foundation for future research on certification body operations, showing that human capital, service management systems, facilities, and support systems are critical in shaping satisfaction. We emphasize the importance of integrating anti-bribery management into existing frameworks, particularly within developing economies. In these regions, where corruption and unethical practices are prevalent in both business and government sectors, halal certification services are still underdeveloped but are expanding rapidly, as evidenced by recent nationwide policies. This calls for new theoretical and empirical frameworks to assess service expectations, a gap that this study addresses.

This study examines variations in satisfaction between two respondent groups, which may stem from unobserved heterogeneity likely present in nationwide firm samples. While this study finds no significant differences between new and renewal applicants, future research should investigate further, as well as variations across firm characteristics like sector, size, age, and location. Subsequent studies must address unobserved heterogeneity—a neglected factor in this field that may lead to oversimplified conclusions.

Future research could explore alternative metrics for assessing applicants' perceptions of halal certification, such as perceived value, willingness to pay, and trust. Future research could also focus on specific sectors like banking, food, pharmaceuticals, tourism, and health for sector-specific insights or examine determinants of service quality, such as auditor competencies, process factors (e.g., customer support, documentation, feedback), and infrastructure (e.g., laboratory capacity, facility location, equipment). A comprehensive study of these elements would enhance understanding of halal certification service delivery. Additionally, the motivations of halal applicants—whether driven by compliance, market value, consumer demand, religious factors, or other factors—also warrant further investigation.

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