

From MSME competitiveness to halal culinary tourism: the role of digital innovation, certification, and collaboration

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ABSTRACT

Purpose: to examine the effects of digital innovation, halal certification, and pentahelix collaboration on MSME competitiveness and to analyze their indirect effects on halal culinary tourism destination development through MSME competitiveness.

Method: this study used a quantitative explanatory approach, with a cross-sectional survey of 150 culinary MSMEs in Semarang City, Indonesia, selected through purposive sampling. Data were collected using structured questionnaires and analyzed using PLS-SEM with SmartPLS to assess the measurement model and test the hypothesized direct and indirect relationships.

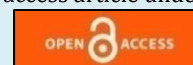
Findings: digital innovation, halal certification, and pentahelix collaboration positively influence MSME competitiveness, which in turn contributes positively to halal culinary tourism destination development. Furthermore, MSME competitiveness significantly mediates the relationships between these three factors and destination development, highlighting the importance of integrating digital capabilities, halal assurance, and stakeholder collaboration to strengthen culinary MSMEs and support sustainable halal culinary tourism.

Implications: the importance of digital innovation, halal certification, and stakeholder collaboration in strengthening MSME competitiveness and halal culinary tourism development.

Originality: lies in integrating digital innovation, halal certification, and pentahelix collaboration into a unified framework, positioning MSME competitiveness as a mediating mechanism for halal culinary tourism destination development.



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Introduction

The halal economy has emerged as a significant global phenomenon, spanning sectors such as food and beverages, Islamic finance, Muslim fashion, pharmaceuticals,

cosmetics, and tourism (Noviyanti & Hakim, 2025; Suryani et al., 2023). Growing consumer awareness of products and services that comply with Islamic principles has further strengthened the halal industry's growth potential (Kareem, 2025). Within this context, halal tourism has gained increasing attention as a form of tourism that accommodates Muslim tourists' religious needs while maintaining the quality and attractiveness of the overall travel experience (Battour & Ismail, 2016; Hariani & Hanafiah, 2024; Qureshi et al., 2025; Said et al., 2022). Indonesia has considerable potential to strengthen its position in the global halal tourism market, supported by its large Muslim population, rich cultural heritage, natural attractions, and diverse culinary traditions (Adinugraha et al., 2025). Among the various forms of halal tourism, halal culinary tourism represents a promising opportunity because food is not only an essential component of the tourist experience but also a medium through which local identity, cultural heritage, and regional distinctiveness can be communicated to visitors (Febriana & Prasetyo, 2023). In this regard, Semarang City, Central Java, offers a relevant context for developing halal culinary tourism through its distinctive culinary heritage, including lumpia Semarang, tahu gimbap, wingko babat, and bandeng presto (Njatrijani, 2018). This sector's development is closely tied to micro, small, and medium enterprises (MSMEs), which contribute to regional economic growth, preserve local culinary traditions, and support the development of the creative economy (Wijandari et al., 2023).

Despite these opportunities, halal culinary tourism in Semarang City faces several interconnected challenges that may constrain local MSMEs' competitiveness and the destination's attractiveness. First, the availability and implementation of halal certification remain important concerns because consumers need reliable assurance regarding the halal status of culinary products. At the same time, businesses must demonstrate compliance with applicable halal requirements. Second, local culinary MSMEs may not have fully optimized digital technology adoption for marketing, customer engagement, business management, and transaction processing, which may limit their market reach and ability to respond to changing consumer behavior. Digital innovation, therefore, involves more than adopting technological tools; it also requires transforming business processes and value creation to improve organizational performance and competitiveness (Nambisan et al., 2017). Third, fragmented collaboration among government institutions, business actors, academic institutions, communities, and media organizations may hinder the coordination of resources, information, promotion, and institutional support required to develop an integrated halal culinary tourism ecosystem. These challenges suggest that culinary MSME competitiveness cannot be understood solely in terms of product quality or price; it must also be examined in relation to technological capabilities, consumer trust, and the institutional environment. Accordingly, the central research problem is how digital innovation, halal certification, and pentahelix collaboration can jointly strengthen MSME competitiveness and how this competitiveness can contribute to developing halal culinary tourism destinations in Semarang City.

The proposed relationships can be explained through several complementary theoretical perspectives. The resource-based view emphasizes that firms can achieve competitive advantage through valuable resources and capabilities that are difficult to replicate (Barney, 1991), while Penrose (2009) highlights the importance of managerial resources and the productive use of existing capabilities in firm growth. From this perspective, digital innovation can strengthen MSME competitiveness by improving access to information, expanding market reach, enhancing operational efficiency, and

enabling the development of new products and business models (Nambisan et al., 2017). Halal certification can complement these capabilities by formally assuring compliance with halal requirements and reinforcing consumer confidence in culinary products, an important consideration in halal-oriented markets (Battour & Ismail, 2016; Tieman et al., 2012). Meanwhile, competitive advantage theory underscores the importance of building distinctive capabilities to strengthen firms' positions within competitive markets (Porter, 1990). At the destination level, collaborative governance and innovation-system perspectives suggest that tourism development depends on interactions among multiple stakeholders rather than the efforts of individual businesses alone. Carayannis & Campbell (2010), through their helix framework, emphasize the interrelationships among knowledge, innovation, society, and the environment, providing a conceptual foundation for examining cross-sector collaboration. Applied to halal culinary tourism, the pentahelix approach, bringing together government, academia, business, communities, and media, can facilitate resource integration, knowledge exchange, institutional support, and destination promotion. Together, these perspectives suggest that digital innovation, halal certification, and stakeholder collaboration are complementary mechanisms through which MSMEs can enhance their competitiveness and contribute to destination development.

Although previous studies have examined digitalization and MSME performance, halal tourism development, and stakeholder collaboration in tourism, these research streams are often discussed separately. Halal tourism research has explored its concepts, practices, challenges, and development strategies (Battour & Ismail, 2016; Ekka, 2024; Muñoz et al., 2025; Suryani et al., 2023), while digital innovation studies have emphasized the transformative role of digital technologies in organizational innovation and value creation (Motamedimoghadam et al., 2025; Nambisan et al., 2017; Urbinati et al., 2022; Vărzaru & Bocean, 2024). Research on halal supply chains has also highlighted the importance of managing halal integrity throughout business operations and distribution processes (Ali et al., 2022; Handayani et al., 2022; Tieman et al., 2012). Nevertheless, an important research gap remains in understanding how digital innovation, halal certification, and pentahelix collaboration can be integrated into a single analytical framework to explain MSME competitiveness and its implications for halal culinary tourism destination development, particularly in the context of Semarang City. The study's novelty lies in its integrated perspective, linking firm-level capabilities and halal assurance to multi-stakeholder collaboration and destination-level tourism development. Rather than treating MSME competitiveness and halal culinary tourism as separate outcomes, this study positions MSME competitiveness as a potential linking mechanism through which digital innovation, halal certification, and pentahelix collaboration may contribute to the development of a more competitive and integrated halal culinary tourism destination. This approach extends the discussion beyond individual business performance by connecting MSME-level strategic resources and collaborative institutional arrangements with broader tourism development objectives.

Accordingly, this study aims to analyze how digital innovation, halal certification, and pentahelix collaboration influence MSME competitiveness and how MSME competitiveness contributes to developing halal culinary tourism destinations in Semarang City. By investigating these relationships within a single framework, the study is expected to make several important contributions. Theoretically, it may enrich the literature on halal tourism, MSME competitiveness, and digital innovation by integrating the resource-based view, competitive advantage perspectives, and collaborative

innovation approaches into a destination-oriented analytical framework. Empirically, it may provide context-specific evidence regarding the factors associated with stronger MSME competitiveness and the development of halal culinary tourism in Semarang City. Practically, the findings may inform local government policies, MSME development programs, halal certification initiatives, digital capacity-building efforts, and collaborative destination marketing strategies involving the five pentahelix stakeholders. These contributions are important because sustainable halal culinary tourism development requires more than the availability of distinctive local foods; it also depends on credible halal assurance, adaptive business capabilities, and coordinated stakeholder participation. Ultimately, the study is expected to provide a foundation for strengthening the competitiveness of local culinary MSMEs while supporting the development of Semarang City as a more integrated, trustworthy, and attractive halal culinary tourism destination.

Literature review

Resource-based view (RBV)

The resource-based view (RBV) provides the theoretical foundation for this study. Developed in the strategic management literature, RBV explains that a firm's competitive advantage depends on its ability to acquire, develop, and effectively use resources and capabilities. Barney (1991) argues that resources can generate sustained competitive advantage when they are valuable, rare, imperfectly imitable, and non-substitutable. This perspective builds on Penrose's (2009) argument that firm growth depends on the productive utilization of resources and managerial capabilities. In the context of culinary micro, small, and medium enterprises (MSMEs), relevant resources include distinctive local culinary products, traditional recipes, product quality, managerial knowledge, digital capabilities, halal certification, and relationships with external stakeholders. However, possessing these resources does not automatically guarantee competitive advantage; their strategic value depends on how effectively they are integrated into business activities and translated into superior customer value.

Digital innovation

Digital innovation refers to developing or transforming products, services, business processes, and value-creation mechanisms by applying digital technologies (Värzaru & Bocean, 2024). Nambisan et al. (2017) explain that digital technologies have transformed conventional innovation processes by enabling new forms of experimentation, collaboration, and value creation. For culinary MSMEs, digital innovation can be manifested through social media marketing, e-commerce platforms, online marketplaces, digital payment systems, customer relationship management, and digital inventory and financial management (Andrayanti et al., 2026). These technologies can help businesses expand their market reach, improve operational efficiency, strengthen customer relationships, and respond more effectively to changing consumer preferences (Al Najjar & Qandeel, 2025).

Halal value chain perspective and halal certification

The halal value chain perspective emphasizes maintaining halal integrity across product sourcing, production, handling, distribution, and marketing (Ali et al., 2022). Tieman et al. (2012) highlights the importance of halal supply chain management in ensuring that the integrity of halal products is maintained throughout business

operations. In the culinary sector, this perspective matters because a food's halal status depends not only on the ingredients used but also on proper handling and production practices (Al-shami & Abdullah, 2023). Halal certification provides formal assurance that a product or business meets the applicable halal requirements set by the relevant authority (Othman & Md Nawi, 2025).

Collaborative innovation and pentahelix collaboration

Collaborative innovation emphasizes how interactions among different actors generate knowledge, develop capabilities, and support innovation (Vivona et al., 2023). Carayannis & Campbell (2010) explain the relationship between innovation, knowledge, society, and the environment through their helix framework, which highlights the interdependence of institutional and societal actors in innovation systems. Building on this broader perspective, the pentahelix approach brings together five stakeholder groups: government, academia, business, media, and communities (Vivona et al., 2023). Government contributes policy support and institutional facilitation; academia provides research, training, and knowledge transfer; business actors contribute entrepreneurial capabilities and market access; media strengthens communication and promotional visibility; and communities support cultural preservation and local participation (Mohammadi et al., 2026).

Competitive advantage and MSME competitiveness

Competitive advantage refers to a firm's ability to create superior value and position itself more favorably than competitors (Aloulou et al., 2024). Porter (1990) emphasizes competitive positioning, differentiation, and efficiency in determining business performance in competitive markets. In this study, MSME competitiveness refers to culinary enterprises' ability to offer attractive, reliable, and distinctive products and services while responding effectively to market demands and competitive pressures (Paramitra et al., 2026). Relevant dimensions may include product quality, culinary uniqueness, price-value relationships, innovation, operational efficiency, customer responsiveness, and market access (Aprianto et al., 2026).

Halal tourism

Halal tourism refers to tourism products, services, and experiences that accommodate Muslim travelers' religious needs and preferences while remaining attractive and satisfying (Said et al., 2022). Battour & Ismail (2016) explain that halal tourism includes considerations such as halal food, appropriate facilities, and services that meet Muslim tourists' needs. However, halal tourism should not be interpreted exclusively as religious tourism or as a market restricted to Muslim visitors (Hariyani & Hanafiah, 2024). Its development may also emphasize general service quality, cleanliness, safety, comfort, and cultural authenticity, which can benefit a broader range of tourists (Sitorus et al., 2024). In halal culinary tourism, food is both a core part of the visitor experience and an expression of local identity and cultural heritage (Adinugraha et al., 2025). The attractiveness of halal culinary tourism depends not only on the availability of these products but also on the credibility of halal assurance, service quality, product accessibility, digital information, and coordination among tourism stakeholders (Nurhayati et al., 2025). The halal tourism perspective therefore provides a sectoral foundation for understanding how competitive culinary MSMEs can help develop a more attractive and trustworthy halal culinary tourism destination (Susiang et al., 2026).

Destination branding

Destination branding involves developing and communicating a destination's identity, image, and reputation to establish a distinctive position in the minds of visitors and other stakeholders (Shoukat et al., 2023). Anholt (2016) emphasizes the importance of place identity, image, and reputation in shaping how destinations are perceived. From this perspective, destination competitiveness depends not only on physical attractions but also on the meanings, experiences, and associations connected to a place (Dwyer, 2022). Culinary products can strengthen destination branding by communicating local culture, traditions, and regional distinctiveness through visitors' experiences (Mishra et al., 2025). In halal culinary tourism, destination branding may be strengthened by combining recognizable local dishes, credible halal assurance, consistent service quality, accessible information, and coordinated promotional activities (Saffinee & Jamaludin, 2024). Competitive culinary MSMEs can support this process by offering distinctive products and satisfying customer experiences that reinforce the destination's identity (Alhafidz et al., 2025).

Hypothesis development

Digital innovation plays a key role in strengthening MSME competitiveness by improving operational efficiency, expanding market reach, building customer relationships, and responding to changing market demands. From the RBV, Barney (1991) argues that valuable resources and organizational capabilities can generate competitive advantage when they are effectively utilized. In this context, digital innovation is a technological and organizational capability that enables MSMEs to transform business processes and create additional customer value. Nambisan et al. (2017) further explain that digital technologies reshape innovation processes by facilitating new forms of value creation, collaboration, and business development. Empirical research on Indonesian MSMEs also suggests that digital transformation and innovation can support competitiveness by improving efficiency, customer engagement, and market access (Agustian et al., 2023). However, the benefits depend on how effectively businesses integrate technology into their operations. Based on these theoretical arguments and empirical considerations, the following hypothesis is proposed:

H1: Digital innovation positively affects MSME competitiveness.

Halal certification can strengthen MSME competitiveness by formally assuring that products meet applicable halal requirements and by increasing the credibility of culinary offerings with consumers. The RBV explains this relationship because certification may serve as a valuable strategic resource that differentiates a business and supports its position in halal-oriented markets (Barney, 1991). This argument is complemented by the halal value chain perspective, which emphasizes the importance of maintaining halal integrity throughout relevant sourcing, production, handling, and distribution activities (Tieman et al., 2012). Battour & Ismail (2016) also highlight the importance of halal food and appropriate services in meeting the needs of Muslim tourists. Empirical evidence from Indonesian food SMEs indicates that the relationship between halal certification and business performance may vary across performance indicators. For example, Giyanti & Indriastiningsih (2019) reported differences in some subjective operational performance measures between certified and non-certified food SMEs, while finding no significant differences in certain profit-related measures. More recent research by Azizah et al. (2025) reported positive relationships between halal certification and operational and financial performance among Indonesian MSMEs.

These findings suggest that halal certification can enhance business competitiveness, although its benefits may depend on market conditions, operational capabilities, consumer awareness, and consistent halal compliance. Based on these theoretical arguments and empirical considerations, the following hypothesis is proposed:

H2: Halal certification positively affects MSME competitiveness.

Pentahelix collaboration is expected to strengthen MSME competitiveness by facilitating access to knowledge, institutional support, training, promotional networks, and complementary business resources. From an RBV perspective, competitive advantage depends not only on internally owned resources but also on an organization's ability to access and effectively use external resources that strengthen its capabilities (Barney, 1991). The collaborative innovation perspective offers a complementary explanation by emphasizing the importance of stakeholder interaction in generating knowledge, supporting innovation, and facilitating development. Carayannis & Campbell (2010) explain that innovation is shaped by relationships among institutional, societal, and knowledge-related actors. In the pentahelix approach, government, academia, business, media, and communities contribute different but complementary resources to the development of MSMEs and tourism destinations. Previous studies on collaborative tourism development in Indonesia have shown the importance of stakeholder coordination in strengthening institutional capacity, community participation, and destination development (Taufik et al., 2023). Based on these theoretical arguments and empirical considerations, the following hypothesis is proposed:

H3: Pentahelix collaboration positively affects MSME competitiveness.

MSME competitiveness is a key potential driver of halal culinary tourism destination development because competitive culinary enterprises can improve the quality, diversity, distinctiveness, and reliability of products and services available to tourists. Porter (1990) emphasizes that competitive advantage depends on an organization's ability to create value and establish a favorable position relative to competitors. This perspective aligns with the RBV, which argues that strategically valuable resources and capabilities can drive superior business performance (Barney, 1991). At the destination level, MSME competitiveness can also be understood through halal tourism and destination branding perspectives. Battour & Ismail (2016) explain the importance of providing products and services that meet Muslim tourists' needs, while Anholt (2016) highlights how place identity, image, and reputation shape destination perceptions. Competitive culinary MSMEs can contribute to these outcomes by offering distinctive local foods, maintaining consistent product quality, communicating halal assurance, and delivering satisfactory customer experiences. Based on these arguments, the following hypothesis is proposed:

H4: MSME competitiveness positively affects halal culinary tourism destination development.

Digital innovation may support the development of halal culinary tourism destinations by strengthening MSMEs' capacity to promote products, communicate information, improve customer service, and reach potential tourists. Nambisan et al. (2017) explain that digital technologies transform innovation and value creation, while Barney (1991) emphasizes the importance of effectively utilizing valuable resources to develop competitive advantage. However, digital adoption alone does not necessarily improve destination development. Its contribution may be greater when digital capabilities translate into stronger MSME competitiveness through improved market access, operational efficiency, product differentiation, and customer engagement. More competitive culinary MSMEs can offer a wider range of attractive products, increase

their visibility among tourists, and help build a more recognizable destination identity. From the destination branding perspective, these improvements can reinforce the image and attractiveness of a culinary destination (Anholt, 2016). Accordingly, MSME competitiveness is expected to transmit at least part of the potential contribution of digital innovation to destination development. This reasoning leads to the following hypothesis:

H5: Digital innovation has a positive indirect effect on halal culinary tourism destination development through MSME competitiveness.

Halal certification may support the development of halal culinary tourism destinations by strengthening product credibility and ensuring compliance with applicable halal requirements. The RBV suggests that certification can become a valuable resource when it helps businesses differentiate their products and improve their market position (Barney, 1991). Meanwhile, the halal value chain perspective emphasizes maintaining halal integrity throughout relevant business activities (Tieman et al., 2012). Empirical findings from Indonesian MSMEs indicate that halal certification may be associated with improved operational and financial performance, although its effects can differ across contexts and performance measures (Azizah et al., 2025; Giyanti & Indriastiningsih, 2019). Therefore, the following hypothesis is proposed:

H6: Halal certification has a positive indirect effect on the development of halal culinary tourism destinations through MSME competitiveness.

Pentahelix collaboration may support halal culinary tourism destination development by giving MSMEs access to knowledge, institutional support, training, marketing networks, and complementary resources. Carayannis & Campbell (2010) provide a theoretical basis for understanding how interactions among different actors can facilitate knowledge exchange and innovation, while the RBV explains how externally accessed resources may strengthen organizational capabilities when they are effectively integrated into business activities (Barney, 1991). In the context of halal culinary tourism, collaboration among government, academia, business, media, and communities can support digital capacity-building, halal certification initiatives, culinary product development, and coordinated destination promotion. However, stakeholder collaboration does not automatically guarantee improved destination outcomes. Based on this reasoning, the following hypothesis is proposed:

H7: Pentahelix collaboration has a positive indirect effect on halal culinary tourism destination development through MSME competitiveness.

Method

This study uses a quantitative, explanatory research design to examine relationships among digital innovation, halal certification, pentahelix collaboration, MSME competitiveness, and halal culinary tourism destination development in Semarang City, Central Java, Indonesia. A cross-sectional design is used to collect data during a specific period, and the proposed relationships are analyzed using Structural Equation Modeling–Partial Least Squares (SEM-PLS) with SmartPLS software. This method enables the assessment of direct and indirect relationships among the research constructs, including the mediating role of MSME competitiveness.

The research focuses on culinary MSMEs operating in the food and beverage sector in Semarang City, particularly those located in culinary centers, tourist areas, and other locations relevant to culinary tourism development. The unit of analysis is the individual MSME, with business owners or managers serving as respondents. Purposive sampling is employed based on the following criteria: the enterprise operates in

Semarang City, has been established for at least one year, utilizes digital technology in at least one business activity, and has obtained or is pursuing halal certification. The target sample consists of 150 culinary MSMEs. Because purposive sampling is a non-probability technique, the findings are interpreted in relation to the participating enterprises rather than as statistically representative of all culinary MSMEs in the city.

Primary data are collected through structured questionnaires administered to eligible MSME owners or managers, supplemented by field observations and brief interviews where appropriate. The questionnaire measures digital innovation, halal certification, pentahelix collaboration, MSME competitiveness, and halal culinary tourism destination development using a five-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). The instrument is developed based on relevant theoretical and empirical literature and should undergo content validation and, where feasible, pilot testing before the main data collection. Observations and interviews provide additional contextual information regarding digital technology utilization, halal-related practices, business operations, and stakeholder collaboration. Participation is voluntary, and respondents are informed about the research purpose and the confidentiality of their responses.

Secondary data are obtained from relevant institutional sources, including the Semarang City Tourism Office, the local government institution responsible for cooperatives and MSMEs, the Halal Product Assurance Organizing Agency, Statistics Indonesia Agency, and relevant scientific publications and reports. These data provide contextual information on MSME development, halal certification, digitalization, and tourism. Where possible, halal certification status is verified through available official records to distinguish formal certification from respondents' perceptions of halal compliance. The collected data are analyzed through descriptive statistics, measurement model evaluation, and structural model assessment using SmartPLS. Measurement quality is assessed through indicator loadings, construct reliability, and convergent validity, while the structural model is evaluated using coefficients of determination and bootstrapping to test the hypothesized direct and indirect relationships at a significance level of 5%.

The research model consists of five principal constructs: digital innovation (X1), halal certification (X2), pentahelix collaboration (X3), MSME competitiveness (Z), and halal culinary tourism destination development (Y). The operational definitions of the research variables are established to ensure that each construct is clearly defined and measured consistently with the research objectives and theoretical framework. This study comprises five main variables: digital innovation, halal certification, pentahelix collaboration, MSME competitiveness, and halal culinary tourism destination development. Each variable is defined conceptually and operationalized into measurable indicators to empirically test the proposed relationships. The operational definitions and indicators of each research variable are presented in Table 1.

The collected data are analyzed using SmartPLS through descriptive statistical analysis, measurement model evaluation, and structural model assessment. Descriptive statistics are used to summarize respondent characteristics and MSME profiles, while data screening is conducted to identify missing responses and inconsistencies. The measurement model (outer model) is evaluated for construct reliability and validity using outer loadings (preferably ≥ 0.70), average variance extracted ($AVE \geq 0.50$), composite reliability, and Cronbach's alpha (≥ 0.70). Subsequently, the structural model (inner model) is assessed using coefficient of determination (R^2) and hypothesized relationships.

Table 1 operational definitions of variables

Variables	Operational definition	Indicator
Digital innovation (X1)	The level of utilization of digital technology in MSME business activities	Digital marketing, social media, marketplace, e-payment
Halal certification (X2)	Implementation and ownership of halal standards in business processes	Halal certificate, halal product guarantee, halal production process
Pentahelix collaboration (X3)	Synergy between stakeholders in developing MSMEs	The role of government, academics, business, media and communities
Competitiveness of MSMEs (Z)	The ability of MSMEs to create added value and compete in the market	Product quality, innovation, marketing, business performance
Halal culinary tourism destinations (Y)	Level of destination readiness to support halal culinary tourism	Culinary attractions, halal facilities, destination image, tourist satisfaction

Hypothesis testing is performed using bootstrapping in SmartPLS to estimate path coefficients, t-statistics, p-values, and confidence intervals, with a 5% significance level applied. A relationship is statistically significant when the p-value is below 0.05, the bootstrapped confidence interval excludes zero, and the coefficient's direction aligns with the proposed hypothesis. H1–H4 examine the direct effects of digital innovation, halal certification, and pentahelix collaboration on MSME competitiveness, as well as the effect of MSME competitiveness on halal culinary tourism destination development. H5–H7 examine the indirect effects of the three independent variables on destination development through MSME competitiveness. The study evaluates are mediation effects using bootstrapped indirect-effect estimates and confidence intervals. Given the cross-sectional design and purposive sampling technique, the findings are interpreted as evidence of statistical relationships rather than definitive causal effects.

Results and discussion

Respondent characteristics

The characteristics of the respondents in this study are described based on gender and business operating period to provide an overview of the demographic composition and business experience of the 150 culinary MSMEs in Semarang City. These characteristics are relevant for understanding the backgrounds of the respondents involved in the development of halal culinary tourism. The distribution of respondents by gender and business operating period is presented in Table 2.

Table 2 respondent characteristics

Characteristics	Category	Frequency	Percentage (%)
Gender	Male	62	41.3
	Female	88	58.7
	Subtotal	150	100.0
Business operating period	1–2 years	27	18.0
	3–5 years	71	47.3
	More than 5 years	52	34.7
	Subtotal	150	100.0

Source: primary data, processed

As shown in Table 2, most respondents were female (58.7%), while males accounted for 41.3%. Regarding business operating periods, the largest proportion of respondents had operated their culinary MSMEs for 3–5 years (47.3%), followed by those operating for more than five years (34.7%) and those operating for 1–2 years (18.0%). These findings indicate that the respondents represented both genders and

businesses with varying levels of operational experience. Furthermore, the substantial proportion of enterprises operating for at least three years suggests that many respondents had accumulated practical experience in managing culinary businesses, providing relevant perspectives for examining digital innovation, halal certification, pentahelix collaboration, and MSME competitiveness in the context of halal culinary tourism development in Semarang City.

Convergent validity test

Convergent validity is assessed to determine the extent to which the indicators used in this study adequately represent their respective latent constructs. In the Partial Least Squares Structural Equation Modeling (PLS-SEM) approach, convergent validity is evaluated by examining the outer loading values of individual indicators. Outer loadings of 0.70 or higher are generally acceptable, indicating that the indicators adequately reflect their corresponding constructs. The outer loading ranges for each research variable are presented in Table 3.

Table 3 outer loading values for convergent validity assessment

Variables	Loading factor range
Digital innovation (X1)	0.742 – 0.891
Halal certification (X2)	0.768 – 0.913
Pentahelix collaboration (X3)	0.734 – 0.887
MSME competitiveness (Z)	0.781 – 0.908
Halal culinary tourism destination development (Y)	0.759 – 0.901

Source: primary data, processed

As presented in Table 3, the outer loading values for all five constructs range from 0.734 to 0.913, exceeding the recommended minimum threshold of 0.70. Pentahelix collaboration has the lowest reported loading value (0.734), while halal certification has the highest (0.913). These results indicate that all reported indicators demonstrate satisfactory individual reliability and meet the recommended outer-loading criterion. Therefore, the indicators can be retained for further analysis based on their loading values. These results support the adequacy of the measurement model for subsequent structural model evaluation and hypothesis testing.

Construct reliability test

Construct reliability testing was conducted to assess the internal consistency of the indicators used to measure each latent construct in this study. The assessment used two commonly used reliability measures in Partial Least Squares Structural Equation Modeling (PLS-SEM): Cronbach's alpha and composite reliability. Values of 0.70 or higher are generally considered acceptable, indicating satisfactory internal consistency among the indicators measuring the same construct. The reliability test results for all research variables are presented in Table 4.

Table 4 construct reliability test results

Variables	Cronbach's alpha	Composite reliability
Digital innovation (X1)	0.889	0.917
Halal certification (X2)	0.902	0.929
Pentahelix collaboration (X3)	0.876	0.911
MSME competitiveness (Z)	0.915	0.936
Halal culinary tourism destination development (Y)	0.901	0.928

Source: primary data, processed

As shown in Table 4, all research constructs demonstrate satisfactory internal consistency, with Cronbach's alpha values ranging from 0.876 to 0.915 and composite reliability values ranging from 0.911 to 0.936. All values exceed the recommended threshold of 0.70, indicating that the indicators consistently measure their respective constructs. MSME competitiveness records the highest Cronbach's alpha (0.915) and composite reliability (0.936), whereas pentahelix collaboration has the lowest Cronbach's alpha (0.876) and composite reliability (0.911). Nevertheless, both constructs meet the recommended reliability criteria. These findings provide evidence that the measurement instruments demonstrate adequate internal consistency and can proceed to further measurement model assessment and structural model evaluation.

Coefficient of determination (R^2)

The coefficient of determination (R^2) is used to evaluate the explanatory power of the structural model by measuring the proportion of variance in an endogenous construct explained by its predictor variables. In this study, R^2 is assessed for two endogenous constructs: MSME competitiveness and halal culinary tourism destination development. Higher R^2 values indicate that the predictor variables explain more of the variance in each endogenous construct. The R^2 results obtained from the SmartPLS analysis are presented in Table 5.

Table 5 coefficient of determination (R^2)

Endogenous variables	R^2	Explained variance (%)
MSME competitiveness (Z)	0.712	71.2
Halal culinary tourism destination development (Y)	0.684	68.4

Source: primary data, processed

As presented in Table 5, the R^2 value for MSME competitiveness is 0.712, indicating that digital innovation, halal certification, and pentahelix collaboration jointly explain 71.2% of the variance in MSME competitiveness. The remaining 28.8% is attributable to factors outside the proposed model and unexplained variance. This result indicates that the three predictor variables have considerable explanatory power in accounting for differences in MSME competitiveness. Meanwhile, the R^2 value for halal culinary tourism destination development is 0.684, indicating that the predictors included in the structural equation explain 68.4% of the variance in this construct. In comparison, the remaining 31.6% is attributable to other factors and unexplained variance. Based on commonly used PLS-SEM guidelines, both R^2 values indicate substantial explanatory power. Overall, the findings suggest that the proposed model explains a considerable proportion of the variance in both endogenous constructs.

Hypothesis testing

Hypothesis testing was conducted using the bootstrapping procedure in SmartPLS to evaluate the significance and direction of the relationships proposed in the research model. The assessment used path coefficients, t-statistics, and p-values to determine whether the hypothesized direct and indirect effects were statistically significant. A hypothesis was considered supported when the p-value was below 0.05, and the path coefficient was consistent with the proposed positive relationship. The results of the hypothesis testing are presented in Table 6.

Table 6 results of direct and indirect hypothesis testing

Hypothesis	Coefficient	T-statistic	P-value	Decision
H1: $X1 \rightarrow Z$	0.312	4.891	0.000	Supported
H2: $X2 \rightarrow Z$	0.281	4.276	0.000	Supported
H3: $X3 \rightarrow Z$	0.354	5.108	0.000	Supported
H4: $Z \rightarrow Y$	0.827	16.221	0.000	Supported
H5: $X1 \rightarrow Z \rightarrow Y$	0.258	4.311	0.000	Supported
H6: $X2 \rightarrow Z \rightarrow Y$	0.232	3.954	0.000	Supported
H7: $X3 \rightarrow Z \rightarrow Y$	0.293	4.822	0.000	Supported

Source: primary data, processed

As shown in Table 6, all seven hypotheses show positive, statistically significant relationships, with t-statistics exceeding the commonly used critical value of 1.96 and p-values below 0.05. Therefore, all hypotheses (H1–H7) are supported by the statistical results. These findings indicate that digital innovation, halal certification, and pentahelix collaboration are positively associated with MSME competitiveness, while MSME competitiveness is positively associated with halal culinary tourism destination development. Furthermore, the three independent variables exhibit significant positive indirect effects on destination development through MSME competitiveness.

The effect of digital innovation on MSME competitiveness

The findings indicate that digital innovation positively influences MSME competitiveness, suggesting that effectively using digital technologies can strengthen culinary businesses' market positions, operational efficiency, and ability to respond to changing consumer preferences. This finding aligns with Nambisan et al. (2017) and Vărzaru & Bocean (2024), who explain that digital technologies transform innovation processes and enable new forms of value creation. From an RBV perspective, digital innovation is a strategic capability that can generate competitive advantage when businesses integrate technological resources into their operational and marketing activities (Barney, 1991). For culinary MSMEs in Semarang City, digital marketing, social media, online marketplaces, and electronic payment systems can help traditional culinary businesses expand their market reach and promote distinctive local products, such as lumpia Semarang and bandeng presto, to a broader audience. However, the benefits of digitalization depend on business owners' digital literacy, managerial capabilities, and ability to translate technology adoption into meaningful customer value, consistent with Penrose's (2009) emphasis on the productive utilization of resources. Therefore, local government institutions, universities, and business associations should strengthen digital capacity-building programs that integrate digital marketing, financial management, customer engagement, and online service quality. Future initiatives should also evaluate whether digital adoption improves market access, customer retention, and operational performance to ensure that digital innovation becomes a sustainable competitive capability rather than merely a promotional tool.

The effect of halal certification on MSME competitiveness

The findings show that halal certification positively affects MSME competitiveness, suggesting that formal halal assurance can strengthen product credibility, boost consumer confidence, and differentiate culinary businesses in halal-oriented markets. This finding is supported conceptually by Battour & Ismail (2016), who emphasize the importance of halal food and appropriate services in meeting Muslim tourists' needs, and Tieman et al. (2012), who highlights the importance of

maintaining halal integrity throughout relevant supply chain activities. From an RBV perspective, halal certification can serve as a valuable strategic resource by strengthening market differentiation and supporting consumer trust (Barney, 1991). In Semarang City, certification can complement the cultural distinctiveness of local culinary products by giving consumers greater assurance that they meet applicable halal requirements. Nevertheless, certification alone may not guarantee stronger business performance, as its benefits depend on product quality, consistent halal practices, service reliability, and effective communication of certification status. This interpretation is consistent with Giyanti & Indriastiningsih (2019), who reported differences in certain operational performance measures between certified and non-certified food SMEs but found no significant differences in some profit-related measures, while Azizah et al. (2025) reported positive relationships between halal certification and operational and financial performance among Indonesian MSMEs. Accordingly, relevant institutions should facilitate certification assistance, provide guidance on maintaining compliance, and support the accurate communication of verified certification information through product labels and digital platforms. Future research should examine how consumer awareness, product quality, and halal compliance practices influence the extent to which certification contributes to MSME competitiveness.

The effect of pentahelix collaboration on MSME competitiveness

The findings indicate that pentahelix collaboration positively influences MSME competitiveness, suggesting that coordinated relationships among government, academia, business, media, and communities can strengthen access to knowledge, institutional support, promotional networks, and complementary resources. This interpretation aligns with Carayannis & Campbell (2010), who emphasize the interrelationships among innovation, knowledge, society, and the environment, and complements the RBV, which explains that competitive advantage depends on the effective utilization of valuable resources and capabilities (Barney, 1991). For culinary MSMEs in Semarang City, government institutions can support business development and halal certification programs, universities can provide research and training, business actors can expand market networks, media organizations can promote local culinary products, and communities can preserve culinary heritage. These complementary contributions can help businesses overcome resource limitations that may constrain their competitiveness. Nevertheless, stakeholder participation does not automatically produce effective collaboration when institutional programs are fragmented, communication is limited, or responsibilities are unclear. The finding therefore implies that collaborative resources must be translated into practical business capabilities to generate meaningful competitive benefits. Local authorities and relevant stakeholders should establish coordinated development programs with clear responsibilities, shared objectives, accessible training, and measurable outcomes. Future studies should examine the quality, continuity, and effectiveness of stakeholder relationships to determine how collaborative governance can strengthen MSME capabilities and support integrated halal culinary tourism development.

The effect of MSME competitiveness on halal culinary tourism destination development

The findings show that MSME competitiveness positively influences halal culinary tourism destination development, indicating that competitive culinary enterprises can boost destination attractiveness through distinctive products, consistent quality, reliable services, and credible halal assurance. This finding aligns with Porter's

(1990) view that competitive advantage depends on the ability to create value and establish a favorable market position, as well as Battour & Ismail's (2016) emphasis on halal food as a key component of Muslim-friendly tourism experiences. It also corresponds with Anholt's (2016) destination branding perspective, which highlights the role of identity, image, and reputation in shaping destination perceptions. From the RBV perspective, distinctive culinary products, business capabilities, and service quality are resources that can drive competitive advantage and create value beyond individual enterprises (Barney, 1991). In Semarang City, local specialties such as lumpia Semarang, tahu gimbal, wingko babat, and bandeng presto can strengthen destination identity when businesses maintain product quality, communicate halal information, and provide satisfactory customer experiences. However, destination development also depends on supporting facilities, accessibility, tourism information, and stakeholder coordination; therefore, MSME competitiveness should be seen as an important contributor rather than the sole determinant of destination development. Local government and tourism organizations should integrate MSME development with culinary route planning, destination promotion, service quality improvement, and reliable halal information systems. Future research should assess destination-level outcomes, including tourist satisfaction, repeat visitation, and perceptions of halal assurance, to establish how enterprise competitiveness translates into broader tourism benefits.

The indirect effect of digital innovation on halal culinary tourism destination development through MSME competitiveness

The findings indicate that digital innovation has a positive indirect effect on halal culinary tourism destination development through MSME competitiveness, suggesting that digital technologies can contribute to destination development by strengthening the competitive capabilities of culinary enterprises. This finding is consistent with Nambisan et al. (2017), who explain that digital technologies enable new forms of innovation and value creation, and with the RBV, which emphasizes that resources generate competitive advantages when they are effectively integrated into business activities (Barney, 1991). In Semarang City, digital platforms can help culinary MSMEs promote local specialties, communicate verified halal information, improve customer interactions, and reach prospective visitors beyond their immediate geographical markets. These benefits may enhance destination visibility when digital capabilities translate into stronger product differentiation, customer responsiveness, and operational efficiency. Nevertheless, digital adoption alone does not guarantee destination development because its benefits depend on digital literacy, information accuracy, service consistency, and the ability to manage customer demand. Consistent with Penrose's (2009) emphasis on productive resource utilization, technological resources must be supported by appropriate managerial capabilities to generate meaningful outcomes. Therefore, government agencies, universities, and tourism organizations should combine digital training with business mentoring, customer service development, and coordinated digital culinary promotion. Future studies should assess both direct and indirect effects and investigate whether digital literacy, business capabilities, or the quality of online information influences the contribution of digital innovation to destination development through MSME competitiveness.

The indirect effect of halal certification on halal culinary tourism destination development through MSME competitiveness

The findings show that halal certification has a positive indirect effect on halal culinary tourism destination development through MSME competitiveness, suggesting that formal halal assurance may support destination development by strengthening business credibility and competitive positioning. This interpretation aligns with Tieman et al. (2012), who emphasizes maintaining halal integrity across relevant supply chain activities, and Battour & Ismail (2016), who highlight the importance of halal food in meeting Muslim tourists' needs. Under the RBV, halal certification can become a valuable strategic resource when it helps businesses differentiate their products, reinforce consumer confidence, and strengthen their market position (Barney, 1991). In Semarang City, certification may complement the distinctiveness of local culinary products by providing greater assurance to consumers and supporting the credibility of halal culinary tourism offerings. However, certification does not automatically guarantee destination attractiveness because its contribution depends on consistent halal practices, product quality, accessible information, and satisfactory service experiences. Previous findings from Indonesian MSMEs also suggest that the relationship between halal certification and business performance may vary across contexts and performance measures (Azizah et al., 2025; Giyanti & Indriastiningsih, 2019). Therefore, policymakers should integrate certification assistance with compliance monitoring, product development, and transparent communication of verified halal status. Future research should investigate whether consumer trust, halal awareness, and service quality strengthen the indirect relationship between halal certification and destination development through MSME competitiveness.

The indirect effect of pentahelix collaboration on halal culinary tourism destination development through MSME competitiveness

The findings indicate that pentahelix collaboration positively affects halal culinary tourism destination development indirectly through MSME competitiveness, suggesting that coordinated stakeholder relationships can support destination development by strengthening culinary enterprises' capabilities and market positions. This interpretation draws on Carayannis & Campbell's (2010) innovation-system perspective, which emphasizes the interdependence of institutional, knowledge-related, and societal actors, and on the RBV, which explains that access to external resources can enhance competitive advantage when those resources are effectively utilized (Barney, 1991). In Semarang City, collaboration among government, academia, business, media, and communities can support MSMEs through halal certification assistance, digital capacity-building, product innovation, business mentoring, and coordinated destination promotion. Such collaboration can strengthen destination development by improving business capabilities and the quality of culinary experiences available to visitors. However, fragmented programs, limited coordination, and unequal access to institutional support may restrict the effectiveness of collaborative efforts. The findings therefore suggest that stakeholder participation must be accompanied by effective coordination and the practical integration of resources into MSME development. Relevant institutions should set shared objectives, clarify stakeholder responsibilities, establish ongoing communication mechanisms, and evaluate program outcomes based on improvements in MSME competitiveness and tourism-related performance. Future studies should examine how stakeholder trust, institutional coordination, and resource-

sharing mechanisms explain pentahelix collaboration's contribution to destination development through MSME competitiveness.

Conclusions

This study examines the relationships among digital innovation, halal certification, pentahelix collaboration, MSME competitiveness, and the development of halal culinary tourism destinations in Semarang City, Indonesia. The findings show that digital innovation, halal certification, and pentahelix collaboration positively affect MSME competitiveness, which in turn positively contributes to halal culinary tourism destination development. Furthermore, the results indicate that MSME competitiveness serves as a significant intermediary pathway through which digital innovation, halal certification, and pentahelix collaboration are associated with destination development. These findings highlight the importance of integrating technological capabilities, credible halal assurance, and cross-sector collaboration to strengthen culinary MSMEs and support the development of a more competitive halal culinary tourism destination. Among the relationships examined, MSME competitiveness exhibits the strongest association with destination development, emphasizing the importance of strengthening enterprise-level capabilities as part of broader tourism development strategies.

This study contributes theoretically by integrating the RBV, halal value chain perspectives, collaborative innovation, and destination branding into a unified framework that links firm-level capabilities to destination development. The findings extend the RBV by showing how digital capabilities, halal certification, and access to external resources through stakeholder collaboration can boost MSME competitiveness and, indirectly, support broader tourism development objectives. Practically, the results suggest that local governments, universities, business associations, media organizations, and communities should coordinate digital capacity-building, halal certification assistance, business mentoring, product quality improvement, and destination promotion. Nevertheless, this study has several limitations. The cross-sectional design restricts the ability to establish causal relationships and examine changes over time, while purposive sampling limits the generalizability of the findings beyond the participating MSMEs. Furthermore, relying on questionnaire responses from business owners or managers may introduce perceptual bias, particularly when measuring destination-level development. The study's focus on Semarang City also means the findings may not fully represent halal culinary tourism destinations in other regions.

Future research should address these limitations by employing longitudinal designs to examine how digital innovation, halal certification, and pentahelix collaboration influence MSME competitiveness and destination development over time. Studies using probability-based sampling and larger samples across multiple cities or regions could improve generalizability and facilitate comparisons across halal culinary tourism contexts. Future investigations should also incorporate multiple data sources, including tourist surveys, stakeholder interviews, verified halal certification records, and objective business performance indicators, to reduce common-method bias and provide a more comprehensive assessment of destination development. In addition, researchers should examine potential moderating factors, such as digital literacy, consumer trust, institutional support, and stakeholder coordination, to identify the conditions under which the proposed relationships become stronger or weaker. Further analysis of direct, indirect, and total effects would also clarify the mediating role of MSME competitiveness. These directions would deepen understanding of the mechanisms linking enterprise capabilities to destination development and provide

stronger evidence for designing sustainable, inclusive, and competitive halal culinary tourism strategies.

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