

Developing a Model to Enhance Customer Loyalty in the Restaurant Business through Digital Transformation, Focusing on Risk and Image

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Abstract

Digital transformation reshapes the restaurant industry by altering customer engagement and operational practices. This study critically examines how digital innovations—such as online ordering systems, mobile applications, and automated services—affect customer loyalty, focusing on the mediating roles of perceived risks and restaurant image. Targeting Thai consumers in Bangkok, this study adopts a mixed-methods approach to gain both breadth and depth of understanding. A structured survey (405 valid responses) was analyzed using Structural Equation Modeling (SEM) to test hypothesized relationships. To complement the quantitative findings, 12 semi-structured interviews with restaurant owners, managers, and digital experts provided contextual insights and practical perspectives, enhancing the study's validity through methodological triangulation. Findings reveal that digital transformation enhances customer loyalty by strengthening the restaurant's image and mitigating perceived risks. However, challenges such as technological failures, data security concerns, and diminished personal interaction continue to pose significant barriers. The study reveals that effective digital strategies enhance customer satisfaction, but managing technological risks is crucial for maintaining trust and loyalty in the digital dining environment.

Keywords: Digital transformation, Customer loyalty, Restaurant industry, Perceived risk, Restaurant image

Introduction

The accelerating pace of digital transformation has fundamentally reshaped how businesses operate, communicate, and deliver value. This phenomenon, driven by rapid technological advancements, is particularly pronounced in the hospitality sector—a vital component of the global tourism industry (Pantano et al., 2017). Within this sector, restaurants have witnessed a profound evolution in their operational and customer engagement strategies, largely due to the integration of digital technologies. The advent of digital tools such as online ordering systems, mobile applications, and automated services has not only streamlined service delivery but also redefined customer experience in significant ways. The outbreak of COVID-19 served as an unprecedented catalyst for change, compelling restaurants worldwide to pivot from traditional business models to digitally enabled operations almost overnight (Gursoy & Chi, 2020). Faced with the dual challenges of maintaining service continuity and ensuring public safety, restaurants rapidly embraced online ordering platforms, contactless payment systems, and automated services to minimize physical contact (Discover Global Network, 2023). This swift digital adoption not only helped safeguard public health but also opened new avenues for customer engagement by facilitating personalized interactions that strengthen customer relationships and drive loyalty (Breugelmans & Liu-Thompkins, 2017).

Despite the numerous opportunities presented by digital transformation, several challenges have emerged. Digitalization enables restaurants to harness customer data to create tailored experiences that enhance satisfaction and foster loyalty (Vo-Thanh et al., 2022). However, this data-driven approach is fraught with challenges. Concerns regarding data privacy, system reliability, and a potential reduction in personal interaction have surfaced as significant barriers to establishing trust among customers (Dinev et al., 2015). In an environment where digital tools are central to service delivery, any lapse in data security or technological performance can undermine customer confidence. Thus, restaurant managers are compelled to strike a delicate balance between embracing innovative digital solutions and implementing robust measures to mitigate these inherent risks. Additionally, the positive correlation between digital transformation and customer loyalty has been documented in various studies, which highlight the role of technological conveniences such as mobile applications and digital loyalty programs in promoting repeat business. These digital tools not only streamline service processes but also facilitate the collection of real-time customer feedback, enabling restaurants to refine marketing strategies and service offerings continuously. Yet, while these benefits are well recognized, the literature reveals a notable gap in understanding how perceived risks and the overall digital image of a restaurant mediate the relationship between technology adoption and customer loyalty. In other words, even though digital innovations are known to enhance customer experiences, there is less clarity regarding how potential risks and a restaurant's online reputation influence consumer attitudes and long-term loyalty.

In today's competitive digital landscape, a restaurant's digital presence extends far beyond its menu or physical ambiance. The reputation that a restaurant cultivates online—through its website, social media engagement, and customer reviews—plays a pivotal role in shaping consumer perceptions (Vermeulen & Seegers, 2009). A robust and positive digital image, bolstered by consistent and reliable technological interactions, can attract new customers while reinforcing loyalty among existing patrons. Conversely, perceived deficiencies in managing digital risks, such as insecure payment processes or unreliable systems, can erode customer trust and deter repeat business (Choi & Cheng, 2020). This is particularly relevant in Thailand, where the food and beverage (F&B) industry is not only a major contributor to the economy but also increasingly influenced by digital engagement.

According to the Ministry of Commerce (2023), digital channels such as food delivery apps, social media platforms, and online review sites now play a central role in consumer decision-making in Thailand's urban areas, especially Bangkok. Thai consumers show high responsiveness to digital convenience and trust signals, including mobile payment security and responsive online communication (Kasikorn Research Center, 2022). Consequently, understanding the interplay between digital transformation, perceived risks, and restaurant image is essential for developing effective strategies that not only attract but also retain customers over the long term in the Thai context.

This study therefore attempts to address the critical gap in the current literature by examining the complex relationships among digital transformation, perceived risks, restaurant image, and customer loyalty within the restaurant industry. This study aims to examine how digital innovations shape consumer behavior in Bangkok's restaurant industry. It focuses on both the benefits—such as improved service quality and personalized experiences that foster customer loyalty—and the challenges, including potential risks that could erode customer trust if not effectively managed. To achieve this aim, the research sets out the following objective:

1. To examine customer perceptions of digital transformation, risk factors, and image in the context of the restaurant industry.
2. To investigate the level of destination loyalty towards restaurants with digital transformation from the perspective of Thai customers in Bangkok province.
3. To explore the relationships between digital transformation in restaurants, risk factors, image perception, and customer loyalty by formulating and validating a conceptual model.

Conceptual Model and Hypothesis Development

The proposed conceptual model, as presented in Figure 1, serves as the foundation for investigating the study's third objective: to explore the complex interplay between digital transformation in the restaurant industry, customers' perceived risk, restaurant image, and customer loyalty. By developing and empirically validating this model, the study seeks to unravel how digital innovations influence consumer behavior and overall brand perception, ultimately affecting loyalty outcomes. Digital transformation in restaurants entails the adoption of various technological tools, such as mobile applications, online ordering systems, digital menus, and contactless payment methods. These technologies are not solely about operational efficiency; they also signal a modern, innovative, and customer-centric approach. For instance, Esposito et al. (2022) demonstrated that digital technology can enhance service innovation by reducing physical interactions and promoting hygiene, which in turn lowers customer-perceived risk. Complementary findings by Zeng et al. (2020) and Shin & Kang (2020) have established a strong link between the adoption of digitalization initiatives in the hospitality industry and increased consumer footfall. Together, these studies highlight that digital transformation not only attracts new customers but also reshapes their perceptions regarding risk and overall dining experience.

While digital transformation is often associated with enhanced efficiency, convenience, and reduced physical contact—particularly relevant during the COVID-19 pandemic—it can simultaneously introduce new dimensions of perceived risk. These risks may stem from uncertainties regarding the reliability of digital systems, concerns about data privacy, lack of human interaction, and potential service failures (Shin & Kang, 2020). For example, when customers interact with self-service kiosks, mobile ordering apps, or AI-based service platforms, they may question the system's accuracy, security, and responsiveness (Kim et al., 2010). This aligns with Esposito et al. (2022), who found that while digital initiatives reduce traditional health-related risks, they may increase perceived technological and psychological risks, such as trust in automation and fear of digital errors. Therefore, Hypothesis 1, which

posits that digital transformation is positively related to customers' perceived risk, is grounded in the recognition that the adoption of new technology, while beneficial, can evoke anxieties related to technological reliability, information security, and depersonalized service encounters. These evolving risk perceptions underscore the importance of balancing innovation with robust trust-building mechanisms. Thus, the following hypothesis is posited:

Hypothesis 1 There is a positive relationship between digital transformation in restaurants and Thai customers' perceived risk.

In parallel, Hypothesis 2 contends that digital transformation enhances the overall image of a restaurant. The integration of technologies such as digital menus and mobile ordering systems improves the efficiency and convenience of service delivery. These innovations, when effectively communicated through digital channels like social media and email marketing, build a reputation for modernity and customer focus. Customers are likely to perceive technologically advanced restaurants as more innovative and responsive, thereby strengthening the restaurant's brand image. This perspective is supported by empirical studies that underscore the role of digital tools in enhancing customer experience and operational transparency (Zeng et al., 2020; Shin & Kang, 2020). Therefore, the hypothesis is proposed:

Hypothesis 2 There is a positive relationship between digital transformation in restaurants and image.

Following these direct relationships, Hypothesis 3 argues that digital transformation directly boosts customer loyalty. When restaurants successfully integrate digital technologies into their operations, they not only improve service efficiency but also build customer trust and satisfaction. This leads to higher levels of repeat patronage, positive word-of-mouth, and an overall willingness among customers to engage more deeply with the brand. The direct link between technological innovation and enhanced customer loyalty has been well documented in hospitality research (Esposito et al., 2022). Thus, the following hypothesis is followed:

Hypothesis 3 There is a positive relationship between digital transformation in restaurants and customer loyalty.

Hypothesis 4 posits that perceived risk significantly influences the overall brand image of a restaurant. In contemporary hospitality settings, digital transformation initiatives that proactively mitigate perceived risks—such as implementing transparent safety protocols, ensuring seamless and secure digital interactions, and maintaining system reliability—play a critical role in shaping customers' cognitive and emotional evaluations of a brand. Recent studies affirm that minimizing technological and health-related uncertainties fosters stronger brand trust and more favorable image perceptions (Helal, 2023). Research by Frontiers in Psychology (2022) further highlights that customer awareness of digital safety and hygiene measures enhances perceived brand credibility and engagement. This aligns with earlier findings in tourism literature, where perceived risk was shown to mediate destination image and consumer decision-making. Accordingly, when restaurants effectively address digital concerns, they not only enhance customer confidence but also elevate brand image. Based on this rationale, the following hypothesis is posited:

Hypothesis 4 There is a positive relationship between Thai customers' perceived risk towards restaurant with digital transformation and image.

Hypothesis 5 addresses the direct effect of perceived risk on customer loyalty. When digital tools diminish uncertainty—by safeguarding data privacy, improving service consistency, or enhancing convenience—customers feel more secure and valued, which fosters greater loyalty. Reduced perceived risk thus minimizes hesitation and promotes repeat patronage. Furthermore, a favorable brand image, nurtured through digital transformation, further reinforces loyalty (Hypothesis 6). As Chen & Kerstetter (1999) and Chew & Jahari (2014) assert, brand image—encompassing both cognitive beliefs and affective feelings—plays a critical role in driving consumers’ behavioral intentions, including their willingness to return and recommend. Together, these hypotheses highlight how managing perceived risks through digital innovation is essential not only for protecting customers but also for strengthening the restaurant’s reputation and fostering enduring loyalty. Thus, the following hypotheses are as follows:

Hypothesis 5 There is a positive relationship between Thai customers’ perceived risk towards restaurant with digital transformation and their loyalty.

Hypothesis 6 There is a positive relationship between image of restaurant with digital transformation and their loyalty.

In summary, the conceptual model critically examines how digital transformation influences consumer perceptions in the restaurant industry. By testing these six hypotheses, the study provides a comprehensive analysis of how technological innovation shapes perceived risk, enhances brand image, and ultimately drives customer loyalty. This framework is underpinned by robust empirical evidence (Esposito et al., 2022; Zeng et al., 2020; Shin & Kang, 2020; Lepp & Gibson, 2003; Chen & Kerstetter, 1999; Chew & Jahari, 2014) and offers significant insights for both academic research and practical applications in a competitive, digitally evolving landscape.

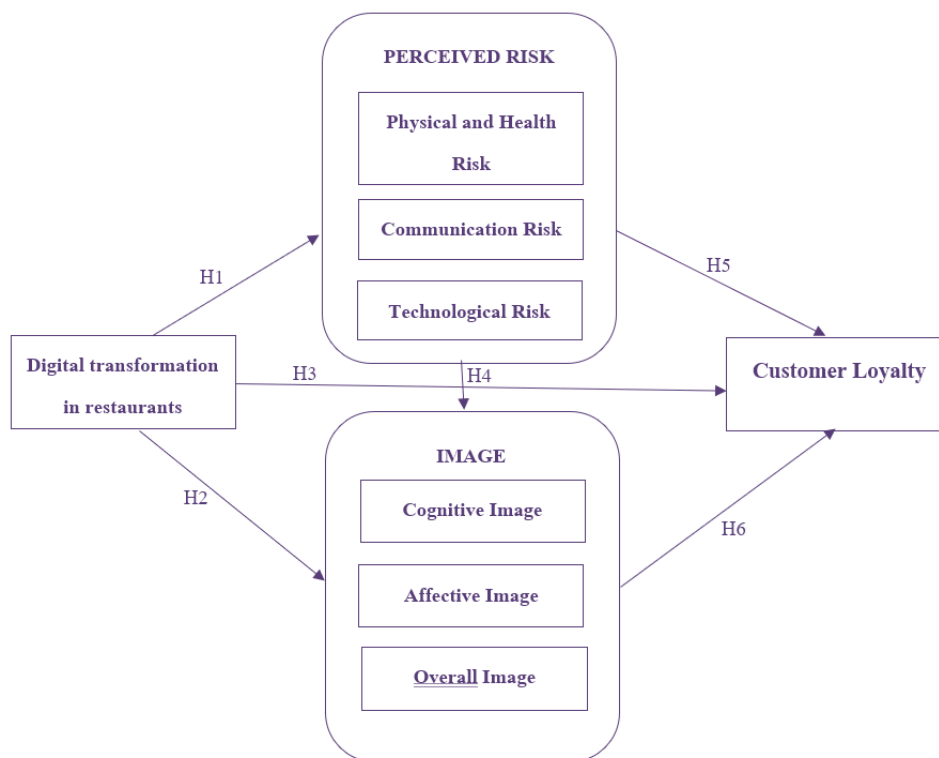


Figure 1 The Conceptual Model (Source: Developed by the researchers, 2025)

Methodology

This study adopted a mixed-methods design, integrating quantitative and qualitative approaches to gain a comprehensive understanding of the impacts of digital transformation in the restaurant industry. The research design was informed by contemporary methodological frameworks (Creswell & Plano Clark, 2018; Fetters, 2019), which emphasize the value of methodological triangulation for enhancing validity and depth of insight. Additionally, the case-based structure aligns with Yin's (2018) principles of mixed-methods case study research, enabling a robust exploration of contextual factors and experiential nuances.

Phase 1: Quantitative Approach

The quantitative component was designed to test hypotheses and uncover statistically significant relationships among key constructs. The specific objectives were to: 1) explore customer perceptions of digital transformation, perceived risk, and restaurant image; 2) investigate customer loyalty in the context of digitally transformed restaurants in Bangkok and 3) test the relationships among these variables.

Population and Sample

The target population for this study comprised Thai customers who had prior experience dining at restaurants that had implemented digital service technologies—such as QR code menus, digital ordering systems, contactless payments, or loyalty apps. Given the study's focus on understanding consumer perceptions of digital transformation, it was essential to select respondents who were meaningfully exposed to such technologies. To ensure the relevance and depth of responses, a purposive sampling strategy was employed (Palinkas et al., 2015). This non-probability sampling approach is suitable for studies requiring participants with specific knowledge or experience, particularly in exploratory or explanatory research designs (Etikan, Musa & Alkassim, 2016). Participants were screened to confirm their exposure to digital dining experiences within the past 12 months. To determine the appropriate sample size, Cochran's (1997) formula was applied, assuming a 95% confidence level and a 5% margin of error. In total, 445 responses were gathered. After screening for missing data and outliers, 405 valid responses remained—meeting and exceeding SEM recommendations. According to Hair et al. (2006) and Bentler & Chou (1987), an ideal SEM sample ranges from 100–200 or 5–10 cases per estimated parameter. Therefore, the final sample size ensured both model adequacy and analytical rigor.

Instrument Development

This study employed a structured questionnaire as the primary instrument for hypothesis testing and data collection. Grounded in validated constructs from prior research, the instrument was designed to capture consumer responses related to digital transformation, perceived risk, restaurant image, and customer loyalty—key variables relevant to behavior in digitally transformed restaurant environments (Nunnally & Bernstein, 1994; Creswell, 2014). The questionnaire comprised five sections: 1) demographics; 2) digital transformation (e.g., mobile ordering, digital payments); 3) perceived risks, including technological, communication, and health-related concerns; 4) restaurant image, covering cognitive, affective, and overall perceptions; and 5) customer loyalty, including revisit intention, word-of-mouth and willing to pay more behaviors.

To enhance construct validity, items were adapted from established literature. Digital transformation was measured using a nine-item scale adapted from foundational information systems and service research (Davis, 1989; DeLone & McLean, 2003; Bitner et al., 2000), and further refined to capture contemporary hospitality contexts. Items were updated and validated following recent industry-specific frameworks (Nikopoulou et al., 2023; Somera & Petrova, 2024), which emphasize cloud-based systems, IoT integration, and real-time guest experience

metrics in hotels and restaurants. Perceived risk was measured with 14 items based on the frameworks of Yeung & Morris (2001) and Chen & Wang (2016), covering multidimensional risk perceptions. The perceived restaurant image was evaluated through 15 items adapted from Kwortnik & Ross (2007) and Parasuraman et al. (2005), while customer loyalty was captured using nine items from Oliver (1999), Zeithaml et al. (1996), and related studies. Each construct included at least three indicators, as recommended by Hair et al. (2011), to improve internal consistency and minimize measurement error (DeVellis, 2017). A 5-point Likert scale ranging from 1 (“strongly disagree”) to 5 (“strongly agree”) was used for all scaled items. This format is widely recognized for its simplicity and ability to quantify subjective attitudes effectively (Likert, 1932; Allen & Seaman, 2007). An optional open-ended section was also included to gather qualitative insights, providing contextual depth to complement quantitative findings (Patton, 2015). Overall, the instrument was carefully structured to ensure methodological rigor, conceptual clarity, and relevance to the research objectives.

Data Analysis

This study employed a rigorous quantitative approach using SPSS Statistics 20 and AMOS 23 to analyze the collected data. SPSS was used to perform descriptive statistics, including means, standard deviations, and percentages, offering an overview of the demographic profile and distributional properties of the dataset (Field, 2018). Following this, the study adopted Anderson and Gerbing’s (1988) two-step approach to Structural Equation Modeling (SEM), which emphasizes the separation of measurement and structural models to ensure validity and reliability.

In the first step, Confirmatory Factor Analysis (CFA) was conducted using AMOS 23 to validate the measurement model. This involved assessing the relationships between observed variables and their respective latent constructs to ensure alignment with theoretical definitions. Convergent and discriminant validity were examined through standardized factor loadings, Average Variance Extracted (AVE), and inter-construct correlations, while reliability was assessed via composite reliability and Cronbach’s alpha (Hair et al., 2014; Nunnally & Bernstein, 1994; Byrne, 2016). Once the measurement model was confirmed, the structural model was analyzed to test the hypothesized relationships among digital transformation, perceived risk, restaurant image, and customer loyalty. SEM was employed for this purpose due to its strength in evaluating complex, multi-path relationships simultaneously, including mediating effects (Kline, 2015). Model fit was assessed using several indices: Chi-square (χ^2), Comparative Fit Index (CFI), Tucker-Lewis Index (TLI), and Root Mean Square Error of Approximation (RMSEA), in accordance with best practices (Schumacker & Lomax, 2016). A satisfactory model fit provided empirical support for the proposed theoretical framework. Overall, the integration of descriptive analysis, CFA, and SEM ensured a robust and comprehensive examination of the data, reinforcing the validity of the study’s conclusions regarding customer loyalty in digitally transformed restaurants.

Phase 2: Qualitative Phrase

Qualitative research aims to understand complex phenomena through non-statistical means, emphasizing depth and context over numerical measurement (Creswell, 2013). Rooted in a naturalistic approach, it explores how individuals construct meaning within real-life settings, capturing motivations, perceptions, and lived experiences that are often overlooked in quantitative studies (Patton, 2001; Merriam & Tisdell, 2016). By embracing the complexity of social phenomena, qualitative research offers interpretive insights and identifies patterns that enrich understanding (Denzin & Lincoln, 2011; Miles et al., 2014). When combined with quantitative methods, it contributes to a more comprehensive and nuanced view of the research problem.

Research Design: Semi-Structured Interviews

To obtain in-depth perspectives on the impact of digital transformation in Bangkok's restaurant sector, this study employed semi-structured interviews with Thai tourists and local stakeholders from both public and private sectors. This qualitative method was selected for its ability to balance structure with flexibility, enabling the researcher to maintain consistency across interviews while allowing respondents to articulate their personal experiences and viewpoints (Creswell & Plano Clark, 2011; Flick, 2002). Semi-structured interviews are particularly well-suited for exploring complex and subjective constructs such as digital transformation, perceived image, perceived risk, and customer loyalty. This approach supports both thematic comparability and the emergence of nuanced, context-specific insights that may not surface through more rigid research instruments (Fontana & Frey, 2000; Smithson, 2008). To ensure methodological rigor, the interview process followed a structured protocol adapted from Lenggogeni (2014), which guided the flow of dialogue while providing sufficient flexibility to accommodate unanticipated but relevant themes. This design choice enhanced the depth and validity of the qualitative findings, aligning them closely with the study's broader research objectives.

Population and Sample

Determining an appropriate sample size in qualitative research is inherently context-dependent, influenced by the study's objectives, the depth of inquiry, and the complexity of the phenomenon being explored. As Mason (2010) highlights, there is no universally accepted standard for qualitative sample sizes; instead, researchers must rely on achieving data saturation—the point at which additional participants yield no new information. Mason further provides practical benchmarks for sample sizes in comparable qualitative studies (see Table 3.5), offering useful guidance for researchers navigating these decisions. Similarly, Guest, Bunce, and Johnson (2006) emphasize that while qualitative research typically requires fewer participants than quantitative studies, rigorous planning is essential to estimate a sample size sufficient to comprehensively explore the research questions. In mixed-methods research, a common practice is to adopt a smaller, purposively selected sample for the qualitative phase, complementing a larger quantitative sample to balance depth and breadth of analysis (Creswell & Plano Clark, 2011). Reflecting these principles, this study engaged twelve participants—including restaurant owners, managers, and digital transformation experts—consistent with Creswell (1998) and Morse's (1994) recommended range of five to twenty-five participants for qualitative inquiries. Purposive sampling was employed to ensure inclusion of individuals with relevant expertise and lived experience, enabling rich, nuanced insights into digital transformation within Bangkok's restaurant industry (Palinkas et al., 2015). This carefully selected sample size facilitates the collection of in-depth, contextually grounded data while aligning with the study's mixed-methods design, ultimately supporting a comprehensive understanding of the complex dynamics at play.

Data Collection

The qualitative phase of this study aims to gather rich, in-depth data from strategically selected key informants, including restaurant entrepreneurs, government officials, and private sector representatives, whose experiences and insights into digital transformation in the restaurant industry are particularly relevant. Data collection will be conducted through semi-structured interviews, a method chosen for its ability to balance flexibility with systematic coverage of core research questions (Kvale & Brinkmann, 2009). The recruitment process begins with clear communication to potential participants, providing detailed information about the study's objectives, the expected role of informants, and the significance of their contributions, thereby fostering trust and informed consent (Ritchie, Lewis, Nicholls, & Ormston, 2013). Eligibility will be confirmed through an initial screening to ensure participants possess relevant experience or involvement in digital transformation initiatives within the

restaurant sector (Bryman, 2016). Interview scheduling will be coordinated to accommodate participants' availability and conducted in settings conducive to candid and comfortable dialogue (Opdenakker, 2006). Prior to commencing, participants will provide written consent acknowledging their understanding of the interview process, including recording procedures and data usage, in adherence to ethical research standards (Wiles, Crow, Heath, & Charles, 2008). Interviews are expected to last between 40 and 60 minutes, allowing sufficient depth while respecting participants' time constraints (Rubin & Rubin, 2012). Utilizing a semi-structured interview guide, the researcher will ensure comprehensive coverage of key topics while remaining responsive to emergent themes and unexpected insights (Creswell & Poth, 2018). All interviews will be audio-recorded with permission to support accurate transcription and rigorous analysis. This carefully designed data collection approach is intended to yield nuanced, contextually grounded insights, enriching understanding of the multifaceted digital transformation processes within the restaurant industry.

Data Analysis

This study employs the qualitative data analysis framework proposed by Miles and Huberman (1994) to systematically process and interpret data collected from semi-structured interviews. Renowned for its structured yet adaptable approach, this methodology facilitates rigorous and insightful analysis through four interconnected stages: data reduction, data display, conclusion drawing, and verification. Data analysis begins immediately after each interview, with the researcher manually transcribing audio recordings to preserve the richness and nuances of participant responses. Supplementary field notes capturing non-verbal cues and contextual observations further enrich the dataset (Miles, Huberman, & Saldaña, 2014). During data reduction, the researcher condenses and refines the transcriptions by coding and categorizing relevant information aligned with the study's objectives, thereby focusing the analysis on meaningful themes while filtering out extraneous content (Saldaña, 2021). The subsequent data display stage organizes these condensed data through visual formats such as matrices, charts, and diagrams, enabling clearer identification of patterns and relationships that textual data alone may obscure (Miles & Huberman, 1994). Drawing conclusions follows, where emerging themes are interpreted within the context of the research questions and theoretical frameworks, while also considering alternative explanations to ensure analytical depth (Creswell & Poth, 2018). Crucially, the final verification phase involves iterative cross-checking and triangulation to confirm the validity and reliability of findings, enhancing the study's trustworthiness and credibility (Lincoln & Guba, 1985; Miles & Huberman, 1994). Collectively, this comprehensive analytical process supports the generation of robust and nuanced insights into the dynamics of digital transformation in the restaurant industry and its influence on customer loyalty.

This study adopts mixed methods design to capture both the breadth and depth of digital transformation in the restaurant industry. The quantitative phase enables hypothesis testing and generalization of findings across a broader population (Creswell & Creswell, 2018), while the qualitative phase offers contextual insights into stakeholder experiences often missed in numeric data (Patton, 2015; Denzin & Lincoln, 2018). This integration enhances both the validity and practical relevance of the research, particularly in dynamic service environments where technology and human behavior interact (Tashakkori & Teddlie, 2010). Aligned with current best practices in digital innovation research (Venkatesh et al., 2013), the approach provides a robust foundation for both academic exploration and strategic decision-making.

Results

Phase 1: Quantitative Phase

The quantitative phase of this study yielded 405 valid responses from Thai customers who frequented digitally transformed restaurants in Bangkok. The demographic analysis indicates a balanced gender distribution (51.85% male, 48.15% female) and a predominant age group of 31–40 years (46.42%). Most respondents were single (70.37%), possessed a bachelor's degree (71.85%), and reported a monthly income predominantly in the range of 25,001–35,000 Baht (48.15%). Regarding their experiences with digital transformation, 38.02% of participants reported visiting these establishments four times, while 28.64% had visited five or more times.

This section aims to achieve two primary objectives: 1) to investigate customer perceptions related to digital transformation, perceived risks, and brand image within the restaurant industry, and 2) to assess destination loyalty toward digitally transformed restaurants from the perspective of Thai consumers residing in Bangkok. The findings reveal a generally positive perception of digital transformation in the restaurant sector, with an overall high satisfaction level (Mean = 4.01). The perceived image of restaurants was analyzed across three dimensions: cognitive, affective, and overall image. The cognitive image, reflecting customers' evaluation of a restaurant's technological competence and operational integration, scored a high mean of 4.13 (S.D. = 0.68), suggesting strong customer approval of digital initiatives. In terms of perceived risks, the analysis was categorized into three key dimensions: physical and health risk (Mean = 3.99), communication risk (Mean = 4.16), and technological risk (Mean = 4.36). Notably, communication and technological risks scored higher, indicating that while customers recognize potential challenges, they still maintain a positive outlook on digital systems. Physical and health risk, while slightly lower, reflects ongoing concerns about hygiene and safety in digitally operated environments—particularly relevant in the post-pandemic context.

Customer loyalty was measured through three indicators: revisit intention, word-of-mouth behavior, and willingness to pay more. Among these, customer loyalty scored the highest (Mean = 4.37, S.D. = 0.52), demonstrating a strong intent among consumers to return to restaurants that effectively leverage digital technologies. These findings collectively underscore the value of digital transformation in enhancing customer satisfaction, mitigating perceived risks, and fostering strong loyalty behaviors in the competitive restaurant landscape.

Structural Model and Analysis of Hypotheses Test

This section addresses the research objective of exploring the relationships among digital transformation in restaurants, perceived risk, image perception, and customer loyalty through the development and validation of a conceptual model using Structural Equation Modeling (SEM). The results demonstrated an acceptable model fit based on a range of fit indices. Specifically, the Adjusted Goodness of Fit Index (AGFI = 0.96) and the Normed Fit Index (NFI = 0.93) surpassed the conventional cutoff of 0.90, indicating a good model fit (Kline, 2016). Other indices—such as the Chi-square ($\chi^2 = 1023.519$), Goodness of Fit Index (GFI = 0.93), Comparative Fit Index (CFI = 0.94), and Root Mean Square Error of Approximation (RMSEA = 0.09)—further support the adequacy of the model. Although the RMSEA slightly exceeds the ideal threshold of 0.08, it remains within acceptable bounds for complex models involving multiple latent constructs (Hair et al., 2010), confirming the model's overall fit and theoretical robustness.

All hypothesized relationships, except for one, exceeded the critical t-value threshold of 1.96, thereby supporting five out of six proposed hypotheses. Detailed statistical outcomes are presented in Table 1. The empirical findings provide nuanced insights into the complex

interplay between digital transformation and customer loyalty. Hypothesis 1 (H1), which posited that digital transformation increases perceived risk, was supported with a standardized estimate of 0.071 and a t-value of 5.786 ($p < 0.01$). This indicates that customers may initially associate digital innovations with heightened concerns, particularly regarding data privacy, system reliability, and unfamiliar technologies. Hypothesis 2 (H2), asserting a positive relationship between digital transformation and perceived image, was also confirmed ($\beta = 0.084$, $t = 5.435$, $p < 0.01$). The adoption of digital tools—such as online ordering systems, digital menus, and personalized recommendations—contributes to a modern and innovative brand image, resonating positively with consumers. Hypothesis 3 (H3) proposed that digital transformation would directly enhance customer loyalty, and the results supported this claim ($\beta = 0.078$, $t = 5.109$, $p < 0.01$). These findings highlight how digital capabilities contribute to improved service quality, convenience, and overall satisfaction, fostering greater loyalty. In contrast, Hypothesis 4 (H4), which suggested that perceived risk would positively influence perceived image, was not supported ($\beta = 0.050$, $t = 0.627$), indicating that heightened risk perceptions do not enhance customer impressions of the restaurant. This underscores the importance for businesses to manage digital-related risks proactively to prevent negative impacts on brand image. Hypotheses 5 and 6 examined the effects of perceived risk and perceived image on customer loyalty. Hypothesis 5 was supported ($\beta = 0.064$, $t = 2.599$, $p < 0.05$), demonstrating a modest but statistically significant relationship. However, Hypothesis 6 was not supported ($\beta = 0.092$, $t = 3.725$, $p < 0.05$), suggesting complexity in the mediating role of image that warrants further investigation. Collectively, the findings suggest that while perceived risk can affect loyalty to some extent, it is the perceived image—encompassing trust, innovation, and professionalism—that plays a more influential role in fostering customer loyalty in digitally transformed restaurants.

A supplemental analysis was conducted to examine the mediating roles of perceived risk and image in the relationship between digital transformation and customer loyalty. The results revealed a significant indirect effect of digital transformation on loyalty through perceived risk (indirect effect = 0.341), suggesting that customers' risk perceptions partially mediate this relationship. More notably, the indirect effect through perceived image was stronger (indirect effect = 0.582), affirming that digital transformation substantially enhances loyalty by positively shaping brand image. These findings emphasize that while digital transformation directly influences loyalty, its full impact is best understood through the dual mediating pathways of perceived risk and image.

Table 1 Results

Hypotheses	Structural paths	Std. Estimate	T-value	Hypothesis result
Hypothesis 1	DTR $\rightarrow$ PR	0.071	5.786**	Supported
Hypothesis 2	DTR $\rightarrow$ PI	0.084	5.435*	Supported
Hypothesis 3	DTR $\rightarrow$ CL	0.078	5.109**	Supported
Hypothesis 4	PR $\rightarrow$ PI	0.050	0.627	Not Supported
Hypothesis 5	PR $\rightarrow$ CL	0.064	2.599*	Supported
Hypothesis 6	PI $\rightarrow$ CL	0.092	3.725*	Not Supported
Variance explained	Indirect effect:			
R^2 (DTR) = 0.579	$\beta_{DTR \rightarrow PR \rightarrow CL}$			
R^2 (PI) = 0.523	= 0.341**			
R^2 (PR) = 0.641	$\beta_{DTR \rightarrow PI \rightarrow CL} =$			
	0.582**			

Note 1. ** $p < 0.01$; * $p < 0.05$

Note 2. DTR= Digital transformation in restaurants, PR= Perceived risk, PI= Perceived image and CL= Customer loyalty

Phase 2: Qualitative Phrase

The primary aim of this study is to gain a deeper understanding of the perspectives of multiple stakeholders on digital transformation in the restaurant industry, particularly concerning customer loyalty, risk, and brand image. The qualitative phase draws on insights from 12 key informants, including restaurant owners, managers, and digital transformation experts, with interviews ranging from 29 to 84 minutes. Participants consistently acknowledged that digital integration has transformed operations and customer interactions. For instance,

Interviewee II stated, *“Our online reservation system has streamlined our front-of-house management and significantly reduced customer wait times.”*

Similarly, Interviewee III noted, *“Mobile ordering platforms have become indispensable—they reduce errors and boost service speed.”*

Interviewee IV added, *“We see digital tools as core to improving the customer journey—from booking to feedback.”*

Interviewee VI emphasized that, *“Guests today expect convenience. Mobile and online systems are now part of their baseline expectation.”*

Interviewee VIII shared, *“We’ve upgraded all touchpoints to digital—from QR menus to online payments—to meet evolving customer behaviors.”*

Interviewee X observed, *“Customers are more satisfied when they can manage their orders and reservations on their own devices.”*

Echoing this, Interviewee XI said, *“Digital platforms allow us to personalize service—what we offer today is not just food, but a seamless experience.”*

Operational improvements were also emphasized. Interviewee III explained, *“Our kitchen display system integrates with ordering to avoid delays and minimize errors.”*

Interviewee IX stated, *“Inventory tracking is now automated, which cuts down waste and improves planning.”*

Interviewee X confirmed, *“Digital tools in the back end have helped us reduce manual work and increase accuracy.”*

COVID-19 accelerated some innovations. Interviewee I remarked, *“Contactless payment was vital during the pandemic—it wasn’t just about convenience, it was about safety.”*

Interviewee VII stated, *“We had to adapt quickly, and contactless became a must-have overnight.”*

Interviewee XII added, *“Digital solutions allowed us to stay open while keeping both staff and customers safe.”*

Participants also identified a strong link between digital innovation and customer loyalty. Interviewee II commented,

“Customers appreciate efficiency—if they have a smooth experience, they’ll come back.”

Interviewee VII agreed: *“Convenience is key. It’s what keeps people coming back, especially busy professionals.”*

Interviewee IX reflected, *“We’ve seen word-of-mouth improve as a direct result of offering seamless digital services.”*

Interviewee VI echoed, *“Personalized digital experiences make our guests feel valued—that drives loyalty.”*

Others discussed revenue impacts. Interviewee V remarked,

“We can charge a bit more because people are willing to pay for convenience.”

Interviewee XI added, *“When systems work flawlessly, guests associate that with higher quality—it justifies the premium.”*

Forward- looking perspectives also emerged. Interviewee I mentioned plans to *“experiment with AI to tailor promotions in real time.”*

Interviewee IV expressed interest in *“using VR to enhance our storytelling and dining themes.”*

Interviewee VI emphasized the need to *“stay ahead by integrating smart tech into the customer experience.”* Interviewee XII concluded, *“Digital isn’t a trend—it’s the future of the dining experience.”*

Thus, stakeholders consistently acknowledged significant progress in digital integration within the restaurant industry. Core technologies—such as online reservation systems, mobile ordering platforms, digital inventory tools, and kitchen display systems—were credited with enhancing both operational efficiency and customer convenience. Contactless payment methods emerged as a particularly crucial innovation during the pandemic, meeting heightened safety expectations. Interviewees emphasized that digital tools not only streamline operations but also play a vital role in fostering customer satisfaction and loyalty. Features like CRM systems, self-service kiosks, and digital feedback platforms support personalized engagement and service quality. Furthermore, many informants highlighted future plans to adopt advanced technologies, including AI and VR, to deliver more immersive and tailored dining experiences. Overall, digital transformation was viewed as a key enabler of repeat visits, positive word-of-mouth, and the ability to command premium pricing in competitive markets.

Despite the evident advantages of digital transformation, key informants voiced a range of critical concerns. Data security and privacy emerged as a recurring theme, with Interviewee I stating,

“The more data we collect, the more we need to protect it—one breach could ruin customer trust.”

Interviewee V similarly cautioned, *“Customers are becoming increasingly aware of how their data is used. We must ensure transparency and compliance.”* This concern was echoed by Interviewees VII, IX, X, and XI, who highlighted the need for secure systems to prevent data leaks and regulatory violations.

Operational disruptions and cost-related issues were also frequently cited. Interviewee II explained,

“Tech upgrades are expensive—not just in terms of hardware, but also in training and maintenance.”

Interviewee IV added, *“Even a short downtime in a digital system can create major service delays.”* These sentiments were echoed by Interviewees V, VII, X, XI, and XII, underscoring the financial and logistical challenges of implementing new technologies.

Another widely expressed concern was the potential erosion of the human touch in customer service. As Interviewee II put it,

“Automation speeds things up, but sometimes it makes the experience feel cold.”

Interviewee III noted, *“People still want to feel acknowledged, not just served by a screen.”* Interviewees VI, VIII, X, and XI echoed this sentiment, warning that excessive reliance on technology may alienate guests who value personal interaction.

In addition, several participants highlighted customer adaptation and technological dependency as major hurdles. Interviewee I remarked,

“Not all customers are tech-savvy—some still prefer face-to-face ordering.”

Interviewee IV added, *“If the system crashes, we’re stuck unless we have a manual fallback.”* Interviewees VI and XII supported these concerns, citing the operational risk of over-reliance on digital tools.

To mitigate such risks, participants proposed robust cybersecurity frameworks as essential. Interviewee III emphasized,

“Encryption and clear data governance are non-negotiable.”

Interviewee VIII reinforced this by stating, *“Investing in security is as important as investing in the technology itself.”* Others, including Interviewees II, IV, V, X, XI, and XII, stressed the importance of compliance with data protection laws and building customer confidence.

Moreover, redundant systems and staff training were repeatedly advocated as critical components of digital readiness. Interviewee I suggested,

“Every digital process should have a manual backup—we can’t afford to be paralyzed.”

Interviewee IV added, *“Staff need continuous training to adapt to updates and avoid errors.”* Interviewees II, III, VI, IX, and XII also emphasized that well-prepared teams are crucial for seamless operations.

Finally, transparent communication during tech disruptions was considered vital to maintaining customer trust. Interviewee III remarked,

“When something fails, honesty is better than silence—customers appreciate that.”

Interviewee VII added, *“Letting guests know we’re working on a solution builds goodwill.”* This was supported by Interviewees IV, VIII, and XI, who believed that proactive communication could reduce frustration and preserve brand loyalty.

Thus, acknowledging the benefits of digital transformation, key informants expressed concerns regarding data security, privacy, operational disruptions, and high implementation costs. Many also noted the potential loss of personal interaction in automated environments and challenges related to customer adaptation and technological dependency. To address these risks, participants emphasized the need for robust cybersecurity, backup systems, and ongoing staff training. Transparent communication with customers during technological disruptions was also viewed as essential for sustaining trust and loyalty.

Digital transformation was found to enhance brand image by positioning restaurants as innovative and customer focused. The integration of digital tools, such as mobile apps and social media engagement, contributes to a modernized and dynamic brand identity. Stakeholders also stressed the importance of aligning digital innovation with customer expectations to sustain a positive image. Looking ahead, future plans include further leveraging AI and VR, upgrading mobile applications, and adopting omnichannel platforms to not only enhance customer experience but also improve operational efficiency and resilience.

Together, the quantitative and qualitative results provide a robust, multi-faceted understanding of how digital transformation influences customer perceptions and loyalty in the restaurant industry. Quantitative data confirms that digital transformation directly and indirectly impacts customer loyalty—mediated by enhanced perceived image and managed risk—while the qualitative insights offer a rich contextual backdrop, emphasizing the need for balancing technological innovation with effective risk management and personalized customer engagement. These integrated findings underscore the importance of continuous innovation and strategic planning to maintain competitiveness in a rapidly evolving digital landscape.

Discussions

The restaurant industry is at a transformative crossroads where innovation and tradition converge. This study, employing a mixed-methods approach, has illuminated the multifaceted impact of digital transformation on customer loyalty, risk perception, and brand image. By integrating quantitative data from 405 customers with qualitative insights from 12 key informants, including restaurant owners, managers, and digital transformation experts—this research provides a comprehensive narrative of the evolving digital landscape in restaurants.

Quantitative findings reveal that Thai diners in Bangkok are largely enthusiastic about digital innovations such as digital menus, mobile applications, self-service kiosks, and contactless payments. These tools are credited with enhancing operational efficiency, reducing wait times, and simplifying the dining process (Pantano et al., 2017). Recent local studies corroborate this trend, noting that urban Thai consumers, particularly in Bangkok, increasingly favor tech-enhanced dining due to the city's fast-paced lifestyle and growing tech-savviness. However, the data also suggests that while these technologies improve convenience, they may inadvertently reduce personal interaction—a key element of traditional dining experiences. This concern is particularly relevant in Thai dining culture, where hospitality and interpersonal warmth—often conveyed through human service—are integral to customer satisfaction. In many Thai restaurants, especially those emphasizing authenticity, digital ordering may be perceived as impersonal, potentially diminishing the emotional connection that diners expect.

Hypothesis 1 was supported (standardized estimate = 0.071, $t = 5.786$, $p < 0.01$), confirming that digital transformation in restaurants heightens perceived risk. This aligns with recent studies showing that while digital tools enhance efficiency and personalization, they also raise concerns about data privacy, system reliability, and unfamiliar technologies. Public trust in digital platforms is crucial in moderating these risks, especially in customer-facing environments. Additionally, rapid technological changes can outpace consumer adaptability, increasing feelings of vulnerability. To mitigate these risks, businesses should promote transparency and data protection, as well as enhance customer control through clear communication and education. Addressing these concerns is essential for fostering trust and sustaining customer loyalty amid digital transformation.

The results supported Hypothesis 2, confirming a significant positive relationship between digital transformation and perceived image ($\beta = 0.084$, $t = 5.435$, $p < 0.01$). The use of technologies like online ordering, digital menus, and personalized services enhances brand image by portraying restaurants as modern, efficient, and customer-focused (Sivarajah et al., 2017). In hospitality, digital tools such as mobile apps and AI-driven recommendations contribute to perceptions of professionalism and innovation. These effects are especially salient among tech-savvy consumers who equate digital capabilities with brand quality. However, as caution, poor implementation can negatively impact customer perceptions, highlighting the need for seamless integration to maximize image benefits.

The support for Hypothesis 3 ($\beta = 0.078$, $t = 5.109$, $p < 0.01$) underscores the pivotal role of digital transformation in enhancing customer loyalty. This aligns with recent literature emphasizing that digital capabilities improve service quality and convenience, which are critical determinants of customer satisfaction and loyalty (Lemon & Verhoef, 2016; though slightly older, foundational; more recent studies confirm this trend). For instance, demonstrated that firms leveraging digital tools effectively streamline customer interactions, leading to superior service experiences that strengthen loyalty bonds. Similarly, digital transformation enables personalized and seamless services, which are increasingly demanded by customers in competitive markets. However, the relatively modest effect size ($\beta = 0.078$) suggests that while digital transformation is a significant driver, it functions alongside other factors such as brand

reputation and emotional engagement. Therefore, organizations should integrate digital initiatives with broader customer relationship strategies to maximize loyalty outcomes.

In contrast to the initial expectation, Hypothesis 4 ($\beta = 0.050$, $t = 0.627$) was not supported, indicating that perceived risk does not positively influence perceived image. This finding aligns with recent research suggesting that heightened risk perceptions typically undermine rather than enhance brand image, particularly in digital contexts where trust is critical. Elevated perceived risk can erode customer confidence and deter engagement, negatively affecting brand reputation and loyalty. The absence of a positive relationship emphasizes the necessity for businesses to implement robust risk management strategies in digital services to safeguard their brand image. Moreover, consumers tend to associate risk with uncertainty and potential losses, which are detrimental to favorable brand perceptions. Thus, proactive risk mitigation and transparent communication are essential to maintain a positive image and competitive advantage in the digital marketplace.

Hypotheses 5 and 6 explored the influence of perceived risk and perceived image on customer loyalty, yielding mixed results. Hypothesis 5 was supported ($\beta = 0.064$, $t = 2.599$, $p < 0.05$), indicating that perceived risk, although modest, has a statistically significant impact on loyalty. This finding aligns with studies showing that risk perception can directly affect customer retention by influencing trust and decision-making processes. Conversely, Hypothesis 6 was not supported despite a significant beta ($\beta = 0.092$, $t = 3.725$, $p < 0.05$), suggesting a more nuanced relationship between perceived image and loyalty than initially assumed. Prior research emphasizes that while a strong brand image typically fosters loyalty, its mediating effects may vary depending on contextual factors such as service quality and customer expectations. These findings collectively highlight that perceived image—encompassing trustworthiness, innovation, and professionalism—exerts a stronger, more direct influence on loyalty in digitally transformed restaurant settings. Thus, restaurants must strategically enhance their brand image alongside managing risks to build sustainable customer loyalty.

A supplemental analysis investigating the mediating effects of perceived risk and perceived image in the digital transformation–customer loyalty relationship revealed compelling insights. The significant indirect effect through perceived risk (0.341) aligns with recent findings that digital transformation can alter customers' risk assessments, which in turn influence loyalty decisions. This partial mediation highlights that risk perceptions remain a critical factor moderating how digital initiatives affect customer retention. More prominently, the stronger indirect effect through perceived image (0.582) underscores the central role of brand image as a conduit through which digital transformation fosters loyalty. This supports prior research emphasizing that digital capabilities not only reduce perceived uncertainties but also enhance customer perceptions of innovation, trustworthiness, and professionalism—key drivers of loyalty. Collectively, these findings suggest that the impact of digital transformation on loyalty is complex and best captured by considering both cognitive risk evaluations and affective brand impressions, providing a more holistic understanding for practitioners aiming to optimize customer relationships.

The qualitative findings from key stakeholders—restaurant owners, managers, and digital experts—offer rich insights into the multifaceted impact of digital transformation on operations, customer loyalty, risk, and brand image. Consistent with prior research, participants emphasized that digital integration significantly enhances operational efficiency and customer convenience through technologies such as online reservations, mobile ordering, and digital inventory systems. These tools not only reduce errors and wait times but also align with evolving customer expectations for seamless, self-service experiences, reinforcing on the centrality of convenience in driving loyalty in digital service settings.

The acceleration of contactless payment adoption during the COVID-19 pandemic highlights digital transformation as both a safety measure and a customer experience enhancer, echoing observation that pandemic conditions catalyzed rapid technological shifts in hospitality to meet health and convenience demands. Stakeholders further linked digital innovation directly to improved customer loyalty, noting that personalized digital experiences and flawless system performance enhance perceived service quality, fostering repeat visits and positive word-of-mouth.

Despite these advantages, informants raised critical concerns aligned with recent literature on digital risks. Data security and privacy were recurrent themes, with fears of breaches undermining customer trust—issues echoed in work emphasizing transparency and compliance as vital for sustaining brand image in digitally intensive operations. Additionally, operational disruptions due to technology failures and high implementation costs reflect challenges documented, who argue that financial and logistical barriers remain key hurdles to full digital adoption.

Notably, participants expressed apprehension about the potential erosion of human touch, highlighting a tension between automation efficiency and the desire for personalized interpersonal interactions. The risk of alienating less tech-savvy customers and over-reliance on digital systems further illustrates the complex dynamics digital transformation introduces to service delivery.

To mitigate these risks, stakeholders emphasized robust cybersecurity measures, redundant systems, comprehensive staff training, and transparent communication during system failures. These strategies align with best practices advocated in recent research underscoring the importance of risk management frameworks and customer engagement to maintain trust and loyalty in digital environments.

Finally, digital transformation was broadly perceived as instrumental in enhancing brand image by signaling innovation and customer-centricity. This resonates who argue that digital capabilities contribute to dynamic brand identities that attract and retain customers. The stakeholders' forward-looking intentions to adopt advanced technologies such as AI and VR for personalized and immersive experiences reflect the ongoing evolution of digital strategies in hospitality aimed at strengthening competitive advantage. In summary, the qualitative phase corroborates and deepens understanding of digital transformation as a double-edged sword in restaurants—driving operational and experiential benefits while introducing risks that require proactive management. The findings advocate for a balanced approach that integrates technological innovation with human-centric service, risk mitigation, and strategic communication to maximize customer loyalty and brand equity in the digital era.

The study's findings highlight the necessity for a balanced strategy that integrates innovative digital tools with robust risk management practices. On the one hand, digital transformation offers significant benefits by enhancing operational efficiency, streamlining customer interactions, and creating a modern brand image. On the other hand, risks related to data security, technical disruptions, and the loss of personal touch pose serious challenges that must be proactively addressed. Restaurants are encouraged to invest in reliable technological infrastructures, implement stringent cybersecurity protocols, and maintain transparent communication with customers regarding data protection and operational contingencies (Dinev et al., 2015; Verhoef et al., 2017).

Conclusion and suggestions

This study examined the transformative impact of digital technologies on customer loyalty, risk perception, and brand image in the restaurant industry. Utilizing a mixed-methods approach, the research integrated quantitative data from 405 customers with qualitative insights from 12 industry stakeholders. The findings indicate that digital tools—such as digital menus, mobile applications, self-service kiosks, and contactless payments—significantly enhance operational efficiency and customer convenience. At the same time, these innovations introduce challenges, notably heightened perceived risks and diminished personal interaction, which may affect customer trust and overall satisfaction. The structural analysis confirmed that while digital transformation directly fosters customer loyalty, its benefits are mediated by an enhanced brand image and effective risk management. These results underscore the critical need for restaurants to adopt a balanced strategy: leveraging digital innovation while proactively addressing concerns related to data security, system reliability, and the human touch. In doing so, restaurants can not only elevate their competitive edge but also ensure long-term customer retention and satisfaction.

The findings of this study, while centered on Bangkok, offer broader implications for other prominent tourist destinations in Thailand that share similar socio-economic and tourism-driven characteristics, such as Chiang Mai, Hat Yai, and Koh Samui. These regions exhibit vibrant hospitality ecosystems and increasing levels of digital engagement, suggesting that insights into consumer behavior, digital adoption, and service innovation in Bangkok may be transferable to these locales. However, to enhance the generalizability and contextual depth of the research, future studies should expand the current scope by incorporating diverse geographic areas, including rural provinces and international destinations. Such expansion would help capture the effects of disparate digital infrastructures, local cultures, and consumer readiness levels. A longitudinal research design is recommended to trace the dynamic evolution of customer perceptions and technology adoption, especially in light of emerging innovations such as artificial intelligence, virtual reality, and augmented reality. Moreover, future research should broaden the conceptualization of risk by addressing not only consumer-related uncertainties but also operational disruptions, health concerns tied to shared digital devices, and psychological phenomena such as digital fatigue. The integration of qualitative methods, such as in-depth interviews and focus groups, would yield nuanced insights into the emotional and cognitive dimensions of digital interactions. Further, exploring brand image through the lenses of sustainability, ethical practices, and cultural authenticity may uncover deeper layers of consumer loyalty. Comparative studies across restaurant types (e.g., fine dining vs. casual dining) and cross-sector analyses with retail and hospitality industries would also help distill best practices and inform more context-sensitive digital strategies tailored to specific market segments.

New knowledge and the effects on society and communities

New knowledge emerging from this study reveals that digital transformation in the restaurant industry significantly enhances operational efficiency, customer satisfaction, and brand image through the adoption of digital tools such as digital menus, mobile applications, and contactless payment systems. At the same time, these advancements introduce challenges—including data privacy concerns and diminished personal interactions—that necessitate a balanced, human-centric approach. The effects of these technological changes extend beyond individual establishments to impact society and local communities. Locally, restaurants that integrate digital innovations contribute to economic growth and service quality

improvements, stimulating community vibrancy and fostering a culture of innovation. However, this shift also risks deepening the digital divide, as segments of the population with limited access or lower digital literacy may be left behind. Consequently, the study highlights the need for policies and strategies that promote inclusivity and mitigate potential negative impacts, ensuring that technological progress translates into sustainable development and broad-based benefits for society as a whole.

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