



# Integration of Digital Payment and E-Commerce as a Market Expansion Strategy for Culinary MSMEs

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**Abstract**—This study examines the adoption of digital payment systems and e-commerce platforms as strategic instruments for market expansion among culinary MSMEs in Pematangsiantar City. Despite the rapid progression of digital transformation in Indonesia, the utilisation of these technologies among MSMEs in medium-sized cities remains limited due to inadequate digital literacy, insufficient infrastructure, and low managerial readiness. Employing a quantitative approach through Partial Least Squares–Structural Equation Modelling (PLS-SEM) with a sample of 100 respondents, this study investigates the influence of digital payment and e-commerce adoption on market expansion strategies. The findings reveal that digital payment significantly enhances market expansion ( $\beta = 0.193$ ;  $p < 0.05$ ), indicating that efficient, secure, and reliable transaction mechanisms strengthen customer reach and business scalability. Conversely, e-commerce adoption does not demonstrate a significant independent effect ( $\beta = 0.127$ ;  $p > 0.05$ ), suggesting that its effectiveness is contingent upon stronger digital competencies and ecosystem support. However, the interaction between digital payment and e-commerce exhibits a significant synergistic effect ( $\beta = 0.158$ ;  $p < 0.05$ ), implying that integrated adoption yields greater strategic value than isolated implementation. With an explanatory power of 5.7%, the model also highlights the presence of other external factors influencing market expansion. Overall, this study contributes theoretical and practical insights into MSME digitalisation in non-metropolitan contexts and offers implications for policymakers and business support institutions in strengthening digital transformation initiatives.

**Keywords:** MSMEs; Culinary; Digital Payment; E-Commerce; Market Expansion

## 1. INTRODUCTION

The rapid advancement of digital technology has transformed the operational landscape of micro, small, and medium enterprises (MSMEs), particularly within the culinary sector, where digital-based services increasingly align with evolving consumer behaviour. Despite these national and global developments, the integration of digital payments and e-commerce among culinary MSMEs in Pematangsiantar City remains limited due to low digital literacy, limited access to technology, and insufficient understanding of the strategic advantages these tools offer. Limited adoption creates challenges for MSMEs in improving operational efficiency, ensuring business continuity, and expanding market reach—factors that are increasingly essential in today’s digital economy (Asmara et al., 2023).

Previous studies have demonstrated that adopting digital payment systems enhances transaction efficiency, increases the speed and security of financial exchanges, and builds consumer trust in MSMEs (Adinda Desi Saputri et al., 2024; Riofita, 2024; Syanova & Fajar, 2024). Similarly, e-commerce adoption has been shown to play a significant role in expanding market reach, supporting product promotion, and building customer loyalty through interactive features such as ratings and reviews (Gao et al., 2023; Wahyundaru et al., 2024). However, most of these studies have focused on metropolitan areas or medium- to large-sized enterprises. Empirical investigations focusing on medium-sized cities such as Pematangsiantar, particularly within the culinary MSME sector, remain scarce. This gap suggests the need for a contextualised study that considers local characteristics and challenges in digital adoption.

In the context of Indonesia’s rapidly evolving digital economy, MSMEs play a crucial role in supporting employment and inclusive growth. However, the level of digital adoption among MSMEs remains uneven, particularly outside major urban centres (Dharma & Yudiono, 2025). The integration of financial technology and online platforms has emerged as a strategic driver for competitiveness and sustainability (Bansal et al., 2025). By leveraging digital payment and e-commerce platforms, MSMEs can streamline operations, reduce costs, and expand their customer networks beyond local boundaries.

The limited use of digital payment and e-commerce among culinary MSMEs in non-metropolitan areas highlights an urgent research problem. While technological infrastructure continues to expand nationwide, disparities in adoption are evident. MSMEs in secondary cities often lack the capacity to fully leverage digital solutions due to resource constraints, limited awareness, and inadequate institutional support. Addressing this issue requires an integrative approach that evaluates each technology separately and explores the synergy between digital payments and e-commerce as a combined strategy for market expansion.

Recent research has emphasised the potential of digital technologies to strengthen MSME performance. For instance, Purwati et al. (2024) highlighted the role of technology-based financial management in improving the sustainability of batik MSMEs in Riau. Wahyundaru et al. (2024) further demonstrated that e-commerce adoption, when combined with financial literacy, positively influences MSME sustainability. Gao et al. (2023) identified the role of e-commerce and digital marketing in sustaining MSMEs during the COVID-19 pandemic, particularly in enhancing resilience and financial performance. Meanwhile, studies by Riofita (2024) and Purba et al. (2024) confirmed the significant contribution of digital payment systems to consumer trust and business productivity. These findings collectively underscore the benefits of digital transformation. Yet, they also reveal a research gap: while individual



technologies have been studied extensively, their integrative role as a combined strategy for culinary MSMEs in medium-sized cities remains underexplored.

The novelty of this study lies in developing an integrative model that positions digital payments and e-commerce not as isolated tools but as complementary instruments for market expansion. This model acknowledges that while digital payments enhance efficiency and trust, e-commerce provides broader visibility and consumer engagement. By analysing both dimensions simultaneously in the context of culinary MSMEs in Pematangsiantar City, the research provides a localised understanding of digital transformation with both theoretical and practical implications.

Theoretically, this research contributes to the technology adoption literature by contextualising the combined effects of digital payments and e-commerce in a medium-sized city setting. It builds on established models, such as the Technology Acceptance Model (TAM), while extending the discussion to integrative adoption strategies. Practically, the study provides insights for culinary MSME owners, local governments, and business support institutions. Strengthening MSMEs' capacity to adopt and integrate digital tools could enhance competitiveness, create new market opportunities, and foster economic resilience in the digital era.

Accordingly, this study formulates two hypotheses: first, that digital payment has a positive influence on the market expansion of culinary MSMEs; second, that e-commerce adoption similarly contributes to market expansion. These hypotheses derive from established theoretical frameworks and empirical evidence but are contextualised for the unique characteristics of Pematangsiantar's culinary MSME ecosystem, where digital adoption remains relatively low.

The integration of digital technologies within the MSME ecosystem has become a central element in achieving inclusive economic growth (Chusnul Jurnalita, 2024). In developing economies, the digitalisation of MSMEs has been shown to reduce transaction costs, enhance marketing efficiency, and support sustainable competitiveness (Kilay et al., 2022a). Furthermore, the adoption of financial technology (fintech) and online marketplace systems enables business actors to connect with broader consumer segments while improving transparency and business scalability (Barroso & Laborda, 2022).

Several studies highlight that digital payment systems, such as QRIS, e-wallets, and mobile banking, not only increase transaction convenience but also foster consumer confidence and purchasing frequency (Usman et al., 2025). In addition, adopting e-commerce platforms contributes to market expansion by enabling real-time customer interaction and data-driven promotional analytics (Salah & Ayyash, 2024). These benefits, however, are often constrained by limited digital capabilities among MSME owners, especially in small- and medium-sized cities, where access to training and infrastructure remains insufficient (Hendrawan et al., 2024).

Local governments and business development institutions play an essential role in bridging these gaps by designing integrated support programs for digital literacy, financial inclusion, and digital marketing (Al-shami et al., 2024). Therefore, understanding the combined influence of digital payments and e-commerce adoption is crucial to formulating strategies that promote inclusive digital transformation for MSMEs in regional contexts such as Pematangsiantar. This study aims to fill that gap by analysing the synergistic role of digital payment and e-commerce in fostering market expansion among culinary MSMEs, thereby extending existing literature on MSME digitalisation in non-metropolitan regions.

In summary, this study seeks to empirically analyse the impact of digital payment and e-commerce on the market expansion of culinary MSMEs in Pematangsiantar City. By addressing the existing research gap and offering an integrative approach, the findings are expected to advance scholarly discourse on digital adoption and to provide actionable recommendations for strengthening MSMEs' digital capacity. This contribution is not only timely but also essential for ensuring the sustainability and competitiveness of culinary MSMEs in an increasingly digital economy.

## 2. RESEARCH METHODOLOGY

### 2.1 Basic Research Framework

This study employed a quantitative research approach with an explanatory design, aiming to test the relationship between independent and dependent variables through hypothesis testing. The research was conducted in Pematangsiantar City, North Sumatra, focusing on culinary MSMEs that have either adopted or shown potential to adopt digital payment and e-commerce technologies.

The population consisted of culinary MSME owners or managers registered with the Cooperative and MSME Office of Pematangsiantar. Using purposive sampling, 100 respondents were selected based on the following criteria: (1) active business operations for at least two years, (2) having a business license or formal registration, (3) using or intending to use digital payment and/or e-commerce, and (4) operating social media or digital platforms for business promotion.

The research variables include:

- Digital Payment (DP) as the independent variable, measured by ease of use, efficiency, security, and consumer trust (Nurqamarani et al., 2024).
- E-Commerce (EC) as the independent variable, measured by platform accessibility, promotion effectiveness, market reach, and customer interaction (Wahyundaru et al., 2024).
- Market Expansion Strategy (MES) as the dependent variable, measured by growth in customer numbers, sales volume, marketing area, and customer loyalty (Gao et al., 2023).

The hypotheses developed were:

- a. H1: Digital payments positively influence the market-expansion strategy of culinary MSMEs.
- b. H2: E-commerce positively influences the market expansion strategy of culinary MSMEs.
- c. H3: The interaction between Digital Payment and E-Commerce (DP × EC) positively influences Market Expansion Strategy, indicating a synergy effect.

The data were analysed using Partial Least Squares – Structural Equation Modelling (PLS-SEM) with SmartPLS 4.0. The technique was chosen because it is suitable for small-to-medium sample sizes and does not require normally distributed data (Hair et al., 2014).

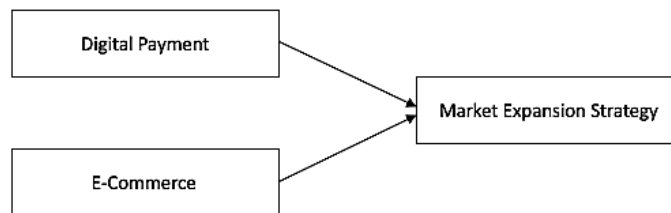
## 2.2 Research Stages

The research was carried out from May to December 2025 in several sequential stages:

- a. Preliminary Study – Literature review and field survey to identify the current adoption of digital payment and e-commerce among MSMEs.
- b. Instrument Development – Designing a Likert-scale questionnaire (1 = strongly disagree to 5 = strongly agree) to measure all variables (Hair et al., 2014).
- c. Validity and Reliability Testing – Pre-testing the questionnaire to ensure construct validity and internal consistency.
- d. Data Collection – Distributing questionnaires both online and offline to culinary MSME owners/managers.
- e. Data Analysis – Processing responses using SmartPLS 4.0, consisting of outer model (validity and reliability) and inner model (hypothesis testing).
- f. Interpretation – Drawing conclusions based on the significance of path coefficients and theoretical implications.

## 2.3 Conceptual Framework

The conceptual framework of this study is illustrated in Figure 1, which shows the hypothesised relationships between digital payment, e-commerce, and market expansion strategies of culinary MSMEs.



**Figure 1.** Conceptual Framework

## 2.4 Measurement Model

The operationalisation of research variables is summarised in Table 1, which includes variable dimensions and measurement indicators.

**Table 1.** Research Variables and Indicators

Variable	Indicators	Source
Digital Payment (DP)	Ease of use, transaction efficiency, security, consumer trust	Nurqamarani et al. (2024)
E-Commerce (EC)	Platform accessibility, promotion effectiveness, market reach, interaction	Wahyundaru et al. (2024)
Market Expansion (MES)	Customer growth, sales volume, marketing area, loyalty	Gao et al. (2023)

## 2.5 Data Analysis Technique

The collected data were analyzed using PLS-SEM, which consists of two main steps:

1. Measurement Model Evaluation (Outer Model): assessing convergent validity, discriminant validity, and reliability using factor loadings, AVE, Composite Reliability, and Cronbach’s Alpha.
2. Structural Model Evaluation (Inner Model): testing hypotheses by examining path coefficients, R<sup>2</sup>, effect size (f<sup>2</sup>), predictive relevance (Q<sup>2</sup>), and significance levels through bootstrapping (Chin, 1998).

# 3. RESULTS AND DISCUSSION

## 3.1 Measurement Model Evaluation

Before testing the hypotheses, the measurement model (outer model) was evaluated to ensure validity and reliability of the constructs. Three aspects were examined: convergent validity, discriminant validity, and reliability. Convergent

validity was assessed using factor loadings and Average Variance Extracted (AVE). Discriminant validity was examined by comparing the cross-loadings of each indicator with its intended construct, while reliability was measured using Composite Reliability and Cronbach’s Alpha. Table 2 summarizes the measurement model evaluation.

**Table 2.** Measurement Model Evaluation

Variabel	Indicator	Loading Factor	Composite Reliability	AVE	Discriminant Validity
<i>Digital Payment (DP)</i>	DP1	0,767	0,908	0,623	Ya
	DP2	0,755			
	DP3	0,771			
	DP4	0,793			
	DP5	0,851			
	DP6	0,795			
<i>E-Commerce (EC)</i>	EC1	0,893	0,97	0,8	Ya
	EC2	0,844			
	EC3	0,906			
	EC4	0,894			
	EC5	0,902			
	EC6	0,935			
	EC7	0,909			
	EC8	0,869			
Market Expansion (MES)	SEP1	0,809	0,932	0,606	Ya
	SEP2	0,798			
	SEP3	0,776			
	SEP4	0,786			
	SEP5	0,834			
	SEP6	0,716			
	SEP7	0,739			
	SEP8	0,764			
	SEP9	0,775			

All indicators demonstrated factor loadings above the threshold of 0.70, while AVE values exceeded 0.50, and Composite Reliability and Cronbach’s Alpha were greater than 0.70. These results indicate that the constructs are valid and reliable.

### 3.2 Structural Model Evaluation

The structural model (inner model) was evaluated using the R<sup>2</sup> values, path coefficients, and hypothesis testing through bootstrapping.

**Table 3.** R-Square Value

Dependent Variable	R <sup>2</sup> (Original Model)	R <sup>2</sup> (With Interaction Term)
Market Expansion Strategy (MES)	0.057	0.094

Including the interaction term increases the explanatory power from 5.7% to 9.4%, indicating that the synergy between DP and EC adds variance explained for market expansion. The R<sup>2</sup> value of 0.057 indicates that Digital Payment and E-Commerce explain 5.7% of the variance in Market Expansion Strategy, while other factors outside the model influence the remaining 94.3%. Although relatively low, this R<sup>2</sup> value still provides valuable insights into the partial role of digital adoption in supporting MSME expansion.

### 3.3 Hypothesis Testing

Hypothesis testing was conducted using bootstrapping with 5,000 resamples. The results are presented in Table 4.

**Table 4.** Hypothesis Testing Results

Path	Original Coefficient (O)	STDEV	t-value	p-value
DP → MES	0.193	0.092	2.092	0.037
EC → MES	0.127	0.128	0.995	0.320
DP × EC → MES	0.158	0.079	2.003	0.046

The hypothesis testing results show that Digital Payment (DP) has a significant positive effect on Market Expansion Strategy (MES), whereas E-Commerce (EC) alone does not have a significant effect. However, the interaction term (DP × EC) demonstrates a significant effect on MES, confirming a synergistic relationship between the



two technologies. This indicates that the combined adoption of digital payment and e-commerce produces a stronger impact on market expansion than when each technology is implemented independently.

### 3.4 Discussion

#### 3.4.1 Digital Payment and Market Expansion

The results confirm that digital payment adoption significantly contributes to market expansion among culinary MSMEs in Pematangsiantar. The positive path coefficient demonstrates that using digital payment systems such as QRIS, e-wallets, and mobile banking enhances transaction efficiency, reduces errors, and increases consumer trust. This aligns with findings by Purba et al. (2024), who showed that digital payment systems improve productivity and customer satisfaction among MSMEs. Similarly, Riofita (2024) highlighted that the adoption of Islamic digital payments positively affects customer purchase decisions, particularly in the MSME sector.

Theoretically, these results strengthen the Technology Acceptance Model (TAM) perspective, which suggests that perceived ease of use and perceived usefulness drive adoption behaviour (Asmara et al., 2023). Practically, they imply that improving digital literacy and access to payment technologies can directly support MSMEs in expanding their customer base. For culinary businesses, which depend on high transaction frequency and customer trust, efficient and secure payment systems are crucial for sustaining competitiveness.

This result also supports global findings that digital payment innovation acts as a gateway to formal financial inclusion. By promoting transparent and traceable transactions, MSMEs can improve creditworthiness and gain access to micro-financing programs. The adoption of digital payment systems also reduces operational risks associated with cash handling, which is particularly relevant for small food enterprises. Moreover, the integration of payment platforms with bookkeeping and inventory systems enables better data-driven decision-making (Tay et al., 2022). These outcomes highlight that digital payments are not merely a technological convenience but a strategic component of business modernisation for MSMEs.

#### 3.4.2 E-Commerce and Market Expansion

Contrary to expectations, the findings reveal that e-commerce adoption did not significantly affect market expansion. This result diverges from studies conducted in metropolitan areas where e-commerce strongly influenced MSME performance (Lusianty, 2023). Several contextual factors may explain this discrepancy.

First, low digital literacy among MSMEs in Pematangsiantar hinders the optimal use of e-commerce features such as targeted promotion, online catalogue management, and customer interaction. Second, many culinary MSMEs in the city still rely heavily on traditional marketing and word-of-mouth strategies, which limits their reliance on digital platforms. Third, limited infrastructure support and weak integration between e-commerce platforms and local logistics reduce the efficiency of online transactions.

This finding echoes Nurdyanto et al. (2024), who found that both financial literacy and managerial capabilities mediate the impact of digital adoption on MSME performance. It also aligns with Morisson & Fikri (2025), who argued that digitalisation benefits are unevenly distributed across regions, with urban areas more likely to realise their full potential compared to smaller cities.

Nevertheless, the insignificant statistical relationship does not imply that e-commerce has no strategic value. Instead, it suggests that the benefits of e-commerce adoption depend on ecosystem readiness and digital competence (Grandon & Pearson, 2003). MSMEs with limited resources may face challenges in maintaining online stores, managing logistics, and responding to customer inquiries promptly. In the culinary sector, where freshness and immediacy are key, logistical delays can reduce customer satisfaction. Therefore, strengthening local supply chain integration and providing e-commerce mentorship programs can help maximise the platform's benefits.

In addition, consumer behavior in smaller cities may be less inclined toward online food purchases due to trust and habit factors (Jabbour Al Maalouf et al., 2025). To overcome this, MSMEs could adopt a "click-and-pick" hybrid model, where customers order digitally but pick up physically, ensuring convenience without sacrificing product quality. Such models have proven effective in other developing regions. Hence, the policy implication is to encourage gradual digital adoption, starting with low-risk and high-impact strategies such as integrating social media marketing with local delivery partnerships.

#### 3.4.3 Theoretical and Practical Implications

Theoretically, this study contributes to the discourse on digital adoption by emphasising the importance of context-specific factors in shaping outcomes. While most prior research confirmed the positive role of e-commerce, this study demonstrates that in medium-sized cities like Pematangsiantar, adoption alone does not guarantee significant benefits unless accompanied by digital capacity building and ecosystem support.

Practically, the findings suggest that stakeholders, including local governments, financial institutions, and platform providers, must collaborate to design targeted interventions. Training programs on e-commerce management, digital marketing, and customer engagement can help MSMEs maximise the potential of online platforms. Furthermore, strengthening logistics integration and digital infrastructure will ensure that culinary MSMEs can leverage e-commerce effectively to expand beyond their immediate markets.



From a theoretical standpoint, this research supports and extends the Technology–Organisation–Environment (TOE) framework by highlighting how external environment factors, such as government support and infrastructure, mediate the effectiveness of digital adoption (Nguyen et al., 2022).

Practically, the implications go beyond MSMEs themselves. Financial institutions can use digital transaction data from payment systems to assess creditworthiness, while local governments can identify sectors most ready for digital expansion (Ariyanti & Marianingsih, 2024). For academia, this study provides a framework for future research on hybrid adoption strategies, combining quantitative and qualitative approaches to explore behavioural and cultural influences in digital transformation.

#### **3.4.4 Contribution and Novelty**

This research contributes novelty by developing and empirically testing an integrative model that evaluates the combined role of digital payment and e-commerce in market expansion. Unlike prior studies that typically analyse these technologies separately, this study highlights the synergy and relative effectiveness of each tool in a medium-sized city context. The results demonstrate that while digital payment provides immediate benefits, e-commerce adoption requires broader systemic support to deliver significant impact.

The study also contributes to policy-making by offering evidence-based recommendations. Policies should not only encourage adoption but also focus on digital literacy, capacity building, and ecosystem strengthening. For MSME practitioners, the findings underscore the importance of prioritising digital payment adoption as a foundational step before expanding into more complex e-commerce strategies.

This integrative approach offers both academic and policy significance. It suggests that sustainable digital transformation for MSMEs must combine technological readiness, institutional alignment, and community empowerment. Therefore, the novelty of this study lies not only in the statistical findings but in its conceptual framing—positioning digital tools as interdependent mechanisms of resilience and growth (Rahman et al., 2025).

#### **3.4.5 Summary of Findings**

The results of this study indicate that digital payment has a significant positive influence on market expansion, thereby supporting Hypothesis 1. In contrast, e-commerce does not show a significant influence, leading to the rejection of Hypothesis 2. Overall, the model explains only 5.7% of the variance in market expansion, suggesting that other factors such as managerial capacity, product innovation, capital access, and government support also play critical roles. These findings highlight the contextual differences between metropolitan and medium-sized cities, where digital payment offers more immediate benefits than e-commerce adoption, which requires broader systemic support to have a significant impact.

In recent years, the digital transformation of MSMEs has been widely recognised as a key driver of economic resilience and competitiveness in developing countries. The integration of digital payment and e-commerce enhances operational efficiency and market connectivity (Kilay et al., 2022). Studies also show that mobile-based payment adoption promotes inclusive financial participation among small entrepreneurs, particularly in non-metropolitan areas (Bhattacharya, 2023).

Furthermore, the success of digital transformation depends not only on technology adoption but also on human capital readiness and government facilitation (Nirwana & Irmawati, 2025). The lack of digital skills, poor cybersecurity awareness, and limited broadband access are barriers that must be addressed to ensure equitable adoption. A synergistic digital ecosystem—including financial institutions, technology providers, and local governments is therefore crucial for enabling MSMEs to integrate technology effectively (Saputra & Ariningsih, 2025).

Another important aspect is digital trust. The perceived security and credibility of platforms largely determine consumers' willingness to engage in online transactions. Therefore, MSMEs that adopt transparent digital payment systems tend to experience greater brand loyalty and repeat purchasing behaviour. E-commerce platforms, when supported by social media marketing, also facilitate two-way communication and community engagement, which in turn strengthen market expansion (Laradi et al., 2024).

The results of this study also resonate with global findings that the digital divide continues to shape MSME competitiveness. Regional disparities in digital infrastructure and education slow down the effectiveness of e-commerce in smaller cities (Lilya & Pasaribu, 2024). This reinforces the importance of ecosystem-based interventions, where digital capability training, mentoring programs, and partnerships with fintech companies are essential for supporting technology adoption. Hence, policymakers should view MSME digitalisation not only as a technological transition but as an inclusive development agenda that strengthens local economic resilience.

## **4. CONCLUSION**

This study concludes that digital payment (DP) and e-commerce (EC) play different roles in supporting the market expansion of culinary MSMEs in Pematangsiantar City. Digital payment demonstrates a significant positive effect on market expansion, indicating that efficient, secure, and trusted transaction systems directly enhance customer reach and business scalability. In contrast, e-commerce does not show a significant independent effect, suggesting that adopting online platforms alone is insufficient without adequate digital readiness and ecosystem support. Most importantly, the



findings confirm that the interaction between digital payment and e-commerce (DP × EC) has a significant positive influence on market expansion, thereby validating the study's core novelty, the integrative or synergistic model. This means that the simultaneous use of both technologies produces a stronger impact than each tool used in isolation, highlighting the complementarity between transaction systems and digital marketplaces. By including this statistically verified synergy, the study provides a more robust understanding of digital adoption among MSMEs. Theoretically, it reinforces the argument that digital tools generate greater value when adopted in an integrated manner. In practice, MSME development programs, local policy strategies, and digital platform initiatives should focus on combined adoption pathways rather than treating digital payments and e-commerce as stand-alone interventions. The study's explanatory power remains modest, indicating that additional factors such as managerial capability, product innovation, access to capital, and infrastructure readiness also play essential roles in driving market expansion. Future research is therefore recommended to incorporate these variables, explore qualitative mechanisms behind digital synergy, and validate the integrative model across broader regional contexts.

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