

Platform Dependence, Demand Volatility, and Sme Resilience in a Heritage Destination: Evidence from Tourism Firms in Melaka

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ABSTRACT

Digital platforms have become critical market infrastructure in tourism destinations, yet their implications for firm resilience remain underexplored. This study examines how platform dependence shapes the financial resilience of tourism small and medium enterprises in Melaka, a mature heritage destination exposed to overtourism risks. Drawing on platform ecosystem theory and resource dependence logic, the study proposes a structural model linking platform dependence to financial resilience through pricing power erosion and demand volatility, with branding capability as a moderating resource. Survey data from 320 tourism firms were analysed using structural equation modelling. The findings show that platform dependence improves short-term occupancy performance but significantly reduces pricing power and increases demand volatility, which in turn weakens financial resilience. Branding capability mitigates these adverse effects by stabilising demand and preserving partial pricing autonomy. The study extends tourism platform research by repositioning platform dependence as a structural vulnerability rather than a purely distributional advantage and highlights the need for capability-based strategies to enhance destination-level resilience.

Keywords: Platform dependence, Tourism SMEs, Demand volatility, Financial resilience, Heritage destinations

INTRODUCTION

Platform dependence as a new structural condition in tourism destinations

Tourism markets are increasingly organised through digital platforms that intermediate search, comparison, booking, and review processes. Online travel agencies and social media platforms shape who is discovered, which products are trusted, and what prices are perceived as fair. This platform layer is no longer a supporting channel. It functions as market infrastructure that influences demand allocation and competitive outcomes. The World Economic Forum highlights that digital platforms can create bargaining power imbalances across travel

and tourism stakeholders, especially where smaller firms lack data and distribution alternatives (World Economic Forum, 2024).

For tourism SMEs, dependence on platforms typically grows from practical necessity. Platforms offer immediate reach, lower customer acquisition costs relative to traditional channels, and conversion benefits through reputation systems and frictionless booking. Yet the same mechanisms can lock firms into commission structures, ranking pressures, and behavioural nudges that push toward discounting and standardisation. A recent integrative review of online travel agency research shows that OTA participation is associated with both performance opportunities and structural constraints, including margin pressure and strategic dependence (Zhou et al., 2024).

In heritage destinations, these dynamics matter more because demand is spatially concentrated, product differentiation is constrained by place based authenticity expectations, and capacity is physically limited. Under such conditions, platform dependence can translate into destination fragility when many SMEs share similar exposure to algorithmic shifts and platform policy changes.

Melaka as a context of platform mediated growth and fragility

Melaka is a mature heritage tourism destination with dense clusters of small accommodation operators and attractions located in compact urban zones. In such settings, tourism growth tends to be episodic and sensitive to seasonal peaks, event cycles, and reputation cascades. Platforms amplify these fluctuations by routing demand toward listings and places favoured by ranking and engagement signals. Research on social media and overtourism increasingly points to concentration effects, where digital visibility intensifies tourist flow clustering rather than distributing demand evenly (Song et al., 2023).

The result is a dual exposure. At the destination level, digital amplification can exacerbate congestion and crowding patterns, feeding the overtourism dynamic. At the firm level, the same amplification can increase revenue volatility, particularly when ranking shocks, review dynamics, or promotion changes disrupt demand. Evidence from heritage tourism contexts also suggests that digital influence is now entangled with visitor flow management and sustainability outcomes, indicating that platform driven visibility is not neutral for destination governance (Shen et al., 2025).

Policy discourse has increasingly shifted toward resilience as a system property, not merely a firm attribute. OECD work on tourism recovery and resilience argues that the sector's vulnerability stems from structural dependencies and weak shock absorption capacity across ecosystems, reinforcing the need for capability building rather than growth only strategies (OECD, 2022). In platform mediated destinations, this implies that resilience depends on whether SMEs can reduce single channel reliance and rebuild strategic autonomy.

Conceptual foundations linking platforms, power, volatility, and resilience

This study is positioned at the intersection of three literatures: platform mediated markets, overtourism and concentration dynamics, and firm resilience.

Platform governance and power reallocation.

Platform scholarship emphasises that digital intermediaries can reorganise industry structure by controlling visibility rules, data access, and transaction conditions. In travel, OTA ranking logic and commission models shape suppliers' strategic room, including their ability to sustain price premiums and protect brand identity (Zhou et al., 2024).

Algorithmic amplification and demand concentration.

Tourism research increasingly treats social media and algorithmic recommendation as drivers of spatial and temporal concentration. Empirical evidence indicates that social media usage can contribute to overtourism through the concentration of tourist flows, even when overall demand growth is not the central mechanism (Song

et al., 2023). This matters for SMEs because concentration typically comes with peak load volatility, operational stress, and unstable revenue patterns.

Resilience as a capability based outcome.

Contemporary resilience research in tourism stresses dynamic capabilities, adaptation, and organisational readiness as key determinants of survival and recovery under shocks. Work on tourism firm resilience during crises shows that capability building and organisational processes are central to sustaining performance under volatility (Prayag et al., 2024). The relevance here is broader than crisis events. Platform dependence can itself be a volatility generator through ranking fluctuations, review cascades, and commission driven price competition.

The present study translates these foundations into a structured causal logic. Platform dependence is expected to raise short term occupancy via visibility and conversion benefits. At the same time, dependence can reduce pricing power because platform competition is price transparent and commission sensitive. Reduced pricing power can increase demand volatility because revenue becomes more exposed to promotional cycles, algorithmic shifts, and competitor discounting. Elevated volatility then weakens financial resilience, defined as cash flow stability and the ability to withstand downturns without destructive cost cutting or excessive debt.

Branding capability is theorised as a buffer. In platform markets, branding capability can preserve pricing power, increase direct demand, and reduce sensitivity to ranking shocks. This proposition also aligns with recent systematic work on digital transformation risks in tourism, which emphasises that governance, concentration, and algorithmic bias require capability and policy responses to avoid dependency traps (Gössling et al., 2025).

Research gap and problem statement

Two gaps motivate the study.

First, OTA and platform research remains fragmented on firm resilience outcomes. Much of the literature assesses distribution efficiency, adoption drivers, or consumer behaviour, while fewer studies test the pathway from dependence to volatility and resilience in an integrated model (Zhou et al., 2024).

Second, overtourism scholarship often focuses on congestion externalities and resident wellbeing, but the financial and strategic fragility of destination SMEs receives less empirical attention. Yet SME fragility is a core transmission mechanism through which overtourism becomes economically destabilising rather than merely socially contested. When many firms become dependent on the same algorithmic infrastructure, destination resilience becomes tied to platform rules that local stakeholders do not control (World Economic Forum, 2024; OECD, 2022).

This study addresses these gaps by providing quantitative evidence from tourism SMEs in Melaka and testing a structural model linking platform dependence, pricing power, demand volatility, and financial resilience, with branding capability as a moderator.

Research objectives and research questions

Objective 1: To estimate the effect of platform dependence on short term occupancy performance among tourism SMEs in Melaka.

Objective 2: To test whether platform dependence reduces pricing power and increases demand volatility through weakened pricing autonomy.

Objective 3: To evaluate the impact of demand volatility on financial resilience and examine whether branding capability mitigates dependence related vulnerability.

These objectives are reflected in the following research questions:

1. To what extent does platform dependence improve short term occupancy performance among tourism SMEs in Melaka
2. Does platform dependence erode pricing power, and does reduced pricing power increase demand volatility
3. Does demand volatility weaken financial resilience, and can branding capability buffer these effects

Expected contributions

Theoretical contribution.

The study advances platform ecosystem thinking in tourism by operationalising platform dependence as a resilience relevant structural condition, not only a distribution strategy. The model links platform governance outcomes to SME vulnerability through pricing power and volatility mechanisms.

Empirical contribution.

The study adds evidence from a Southeast Asian heritage destination where platform reliance is high and overtourism risk is nontrivial. It responds to calls for more destination grounded SME research that can inform policy and practice.

Practical contribution.

For SMEs, the findings are positioned to clarify when platform participation enhances performance and when it creates instability. For policymakers, the results inform capability-based interventions that reduce algorithm dependence risks and support resilience-oriented tourism development (OECD, 2022).

LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Conceptual framework and theoretical anchoring

This study develops a structural framework that explains how platform dependence shapes financial resilience among tourism SMEs through pricing power and demand volatility, with branding capability as a moderating mechanism. Each construct is grounded in a specific theoretical lens to ensure conceptual clarity and to address concerns of construct validity and causal interpretation.

Platform dependence is anchored in platform ecosystem theory, which conceptualises digital platforms as market organisers that coordinate transactions, control data flows, and govern visibility through algorithmic rules (Parker et al., 2016; Kenney & Zysman, 2020). Pricing power is rooted in resource dependence theory, which predicts that organisations reliant on powerful external actors experience reduced strategic autonomy (Pfeffer & Salancik, 1978). Demand volatility draws from complexity and amplification perspectives in tourism, particularly those linked to overtourism and algorithmic concentration effects (Milano et al., 2022; Sigala, 2024). Financial resilience is grounded in resilience economics and tourism SME resilience literature, which emphasise liquidity, adaptability, and shock absorption capacity rather than static financial ratios (Prayag et al., 2024). Branding capability is informed by the resource-based view, which treats intangible capabilities as sources of sustained competitive advantage (Barney, 1991).

Together, these lenses provide a coherent causal logic. Platform dependence improves market access but reallocates power toward platforms. Reduced power constrains pricing autonomy, increasing exposure to demand fluctuations. Persistent volatility undermines financial resilience. Branding capability is expected to weaken this vulnerability by restoring partial autonomy and stabilising demand.

Digital platforms and tourism SMEs

Tourism SMEs operate under structural constraints that heighten sensitivity to demand shocks, including limited capital buffers, high fixed costs, and labour intensive operations. Digital platforms offer access to global demand

at relatively low entry cost, making them attractive distribution channels for SMEs. However, platform mediated access also restructures competition by standardising information, intensifying price transparency, and embedding commission based revenue extraction (Dolnicar, 2022).

A recent systematic review of online travel agency research shows that while platforms enhance visibility and booking efficiency, they also increase supplier dependence and reduce control over customer relationships (Zhou et al., 2024). In destinations where SMEs dominate supply, shared dependence on a small number of platforms creates correlated exposure to platform policy changes, algorithm updates, and ranking adjustments. This collective exposure transforms firm level dependence into destination level fragility.

Platform dependence

Platform dependence refers to the degree to which a firm relies on digital platforms for customer acquisition, bookings, and revenue generation. Dependence is multidimensional and extends beyond transaction volume.

First, revenue concentration reflects the share of total sales mediated by platforms. High concentration increases exposure to commission changes and promotional cycles. Second, visibility dependence arises when discovery is largely controlled by platform ranking and paid placement mechanisms. Third, data dependence occurs when platforms retain customer data and limit direct relationship building.

Competition and regulatory analyses of digital markets highlight how algorithmic ranking and commission structures systematically disadvantage small suppliers by limiting strategic discretion (Kenney & Zysman, 2020; Malaysia Competition Commission, 2023). In tourism, these mechanisms translate into constrained pricing autonomy and limited differentiation opportunities, particularly for firms without strong brand recognition.

Short term performance benefits of platform dependence

Platform dependence can generate short term performance benefits, particularly in terms of occupancy and booking volume. Platforms reduce search costs for consumers, provide trust signals through reviews, and facilitate conversion through integrated payment and cancellation systems. For SMEs with limited marketing capabilities, these functions substitute for costly distribution infrastructure.

Empirical studies consistently report positive associations between platform participation and occupancy or sales volume, especially for small accommodation providers (Dolnicar, 2022; Zhou et al., 2024). However, these gains are often achieved through increased price competition and commission exposure, suggesting that volume growth does not necessarily translate into improved financial stability.

Hypothesis 1: Platform dependence positively influences short term occupancy performance.

Platform governance and pricing power erosion

Pricing power refers to the ability of firms to set prices that reflect costs, quality differentiation, and strategic positioning without being forced into excessive discounting. In platform mediated tourism markets, pricing power is constrained by platform governance mechanisms.

Commission based fee structures reduce the net revenue retained by suppliers, intensifying pressure to maintain volume (Malaysia Competition Commission, 2023). High price transparency enables consumers to compare offerings instantly, weakening differentiation based on non price attributes. Algorithmic ranking systems often reward conversion rates and price competitiveness, nudging suppliers toward discounting to preserve visibility (Sigala, 2024).

Empirical evidence indicates that high platform dependence is associated with margin compression and reduced pricing autonomy among accommodation providers (Zhou et al., 2024). These dynamics are consistent with resource dependence theory, which predicts reduced autonomy under asymmetric power relationships.

Hypothesis 2: Platform dependence negatively influences pricing power.

Demand volatility in platform mediated destinations

Demand volatility refers to fluctuations in booking intensity and revenue across time. While seasonality is a traditional feature of tourism, digital platforms can amplify volatility through algorithmic and social mechanisms.

Algorithmic changes, review cascades, and promotional campaigns can rapidly reallocate demand among suppliers. Social media exposure can concentrate visitor flows into specific locations and periods, intensifying peaks and deepening troughs (Milano et al., 2022; Sigala, 2024). Empirical research on visitor flow pressure in heritage destinations shows that digital visibility is closely linked to concentration and instability patterns (Shen et al., 2025).

Pricing power interacts directly with volatility. Firms with limited pricing autonomy are more exposed to platform driven promotions and competitor discounting, increasing booking instability.

Hypothesis 3: Pricing power negatively influences demand volatility.

Financial resilience under volatile demand conditions

Financial resilience is defined as the ability to maintain financial functioning and absorb shocks without resorting to destructive cost cutting or excessive debt. In tourism SMEs, resilience depends heavily on cash flow stability, liquidity management, and adaptive financial practices (Prayag et al., 2024).

Volatile demand increases working capital strain, complicates staffing and inventory decisions, and raises default risk. Empirical studies show that tourism firms with higher revenue volatility exhibit weaker survival prospects and slower recovery from shocks (Gössling et al., 2023). Volatility therefore functions as a chronic stressor rather than a temporary disturbance.

Hypothesis 4: Demand volatility negatively influences financial resilience.

Branding capability as a moderating resource

Branding capability reflects the ability to generate recognition, loyalty, and repeat visitation, enabling firms to attract demand beyond platform mediated channels. Strong branding supports direct bookings, reduces reliance on algorithmic visibility, and enables price premiums.

From a resource based perspective, branding capability constitutes an intangible asset that is difficult to imitate and thus provides strategic protection against dependency traps (Barney, 1991). Tourism research shows that brand strength stabilises demand and enhances resilience during periods of uncertainty (Dolnicar, 2022; Prayag et al., 2024).

In platform dominated environments, branding capability is expected to weaken the negative effects of platform dependence by preserving partial pricing autonomy and reducing sensitivity to ranking shocks.

Hypothesis 5: Branding capability moderates the relationship between platform dependence and financial resilience such that the negative effect is weaker at higher levels of branding capability.

Addressing endogeneity and measurement validity

Causal inference in cross sectional survey research is subject to endogeneity concerns, including reverse causality, omitted variable bias, and common method variance.

Reverse causality may arise if financially resilient firms are better able to invest in branding and direct channels, thereby reducing platform dependence. This risk is mitigated by modelling dependence as an upstream structural condition and testing alternative model specifications during robustness analysis (Hair et al., 2022).

Omitted variable bias is addressed by incorporating theoretically grounded control variables such as firm size, firm age, subsector, and location centrality. Including direct and indirect paths further reduces misattribution of effects.

Common method variance is mitigated through procedural remedies, including anonymity assurance and careful item design, complemented by statistical diagnostics recommended in the methodological literature (Podsakoff et al., 2003).

Measurement validity is assessed through confirmatory factor analysis, composite reliability, average variance extracted, and heterotrait monotrait ratios to establish convergent and discriminant validity (Henseler et al., 2015).

Summary of hypotheses

H1 : Platform dependence positively influences short term occupancy performance.

H2 : Platform dependence negatively influences pricing power.

H3 : Pricing power negatively influences demand volatility.

H4 : Demand volatility negatively influences financial resilience.

H5 : Branding capability weakens the negative effect of platform dependence on financial resilience.

RESEARCH METHODOLOGY

Research design and empirical strategy

This study adopts a quantitative, explanatory research design to examine the structural relationships between platform dependence, pricing power, demand volatility, branding capability, and financial resilience among tourism SMEs in Melaka. The design is cross sectional with firm level observations and is explicitly theory driven, aligning with prior platform economy and tourism resilience research that employs survey based structural modelling to test causal mechanisms rather than descriptive associations (Hair et al., 2022; Prayag et al., 2024).

Structural equation modelling is employed as the primary analytical technique. SEM is appropriate because the research model includes multiple latent constructs, mediating relationships, and a moderating effect, all of which must be estimated simultaneously. The objective is not prediction alone, but theory testing under conditions of latent variable measurement and complex causal pathways.

Unit of analysis and study context

The unit of analysis is the individual tourism SME operating within the Melaka destination system. SMEs are defined in accordance with Malaysian SME Corporation guidelines, covering small and medium sized accommodation providers and visitor attractions.

Melaka provides a theoretically relevant context for three reasons. First, the destination exhibits high digital mediation, with online travel agencies and social media platforms acting as dominant demand gateways. Second, tourism supply is fragmented and SME dominated, increasing vulnerability to platform governance. Third, the compact spatial structure of the heritage zone intensifies demand concentration and volatility effects. These features make Melaka a suitable setting for examining platform induced fragility rather than idiosyncratic firm failure.

Population, sampling frame, and data collection

Population and sampling

The population comprises registered accommodation providers and attraction operators listed with state tourism authorities and local councils in Melaka. A stratified sampling approach was applied to ensure representation across accommodation types and attraction categories, including hotels, guesthouses, homestays, museums, and experiential attractions.

Stratification mitigates sectoral bias and enhances external validity within the destination context. The final dataset consists of 320 usable responses, which exceeds minimum sample size requirements for SEM given the model complexity and number of indicators (Hair et al., 2022).

Survey administration

Data were collected through a structured questionnaire administered between specified months. Respondents were owners or senior managers with direct responsibility for pricing, distribution, and financial decision making. This choice reduces informational asymmetry and improves construct accuracy for strategic and financial variables.

Procedural remedies were implemented to reduce common method variance. Respondent anonymity was assured, items were grouped by construct rather than causal order, and neutral wording was used throughout. These steps follow established recommendations for survey based organisational research (Podsakoff et al., 2003).

Panel structure and data characteristics

Although the data are cross sectional at the firm level, several constructs explicitly capture temporal variation. Demand volatility and financial resilience are operationalised using retrospective assessments over a defined recent period rather than single point perceptions. This creates a pseudo panel structure in which respondents evaluate performance variability across time, a practice commonly adopted in tourism resilience research where longitudinal financial data are unavailable (Prayag et al., 2024).

The absence of true panel data is acknowledged as a limitation. However, the analytical focus is on structural relationships rather than dynamic trajectories. Robustness checks are incorporated to assess sensitivity to alternative specifications and reverse causality risks.

Variable operationalisation and measurement

All latent constructs are measured using multi item reflective scales on seven point Likert type anchors. Scale development prioritised theoretical alignment, content validity, and clarity for practitioner respondents.

Platform dependence

Platform dependence captures the extent to which firms rely on digital platforms for demand generation and revenue. Items reflect revenue concentration on platforms, reliance on platform ranking and visibility, and sensitivity to platform policy or algorithm changes. This operationalisation aligns with platform ecosystem and resource dependence literature, which emphasises concentration and control as core dependence dimensions (Kenney & Zysman, 2020; Zhou et al., 2024).

Occupancy performance

Occupancy performance represents short term operational outcomes associated with platform exposure. Items assess perceived occupancy stability and booking volume relative to capacity. The construct is positioned as a performance outcome rather than a financial resilience indicator, consistent with the study's distinction between volume and stability.

Pricing power

Pricing power is measured through perceived autonomy in setting prices, resistance to discount pressure, and ability to maintain margins despite platform competition. This operationalisation follows tourism pricing and distribution research that treats pricing autonomy as a strategic capability rather than a purely financial metric (Dolnicar, 2022).

Demand volatility

Demand volatility captures the extent of fluctuation in bookings and revenue intensity over time. Items focus on variability rather than absolute performance, reflecting the construct's role as a destabilising mechanism. This approach is consistent with volatility measurement in tourism resilience and complexity studies (Milano et al., 2022; Sigala, 2024).

Financial resilience

Financial resilience reflects the firm's capacity to absorb demand shocks without severe operational disruption. Items assess cash flow stability, ability to meet financial obligations during downturns, and confidence in surviving adverse demand conditions. This conceptualisation aligns with recent tourism SME resilience research that emphasises liquidity and shock absorption over static profitability ratios (Prayag et al., 2024).

Branding capability

Branding capability measures the firm's ability to generate recognition, repeat visitation, and direct bookings. Items capture brand visibility, customer loyalty, and reduced reliance on intermediaries. The construct is grounded in the resource based view, where branding is treated as an intangible, difficult to imitate capability (Barney, 1991).

Measurement model assessment

Confirmatory factor analysis is conducted to assess reliability and validity prior to hypothesis testing. Internal consistency reliability is evaluated using composite reliability, with thresholds above 0.70 indicating adequacy (Hair et al., 2022).

Convergent validity is assessed through indicator loadings and average variance extracted values exceeding 0.50. Discriminant validity is evaluated using the heterotrait monotrait ratio, with values below 0.85 indicating satisfactory distinction between constructs (Henseler et al., 2015).

Multicollinearity is assessed using variance inflation factors, with conservative thresholds applied to ensure stability of parameter estimates.

Identification logic and structural model specification

The structural model is identified by theory driven causal ordering rather than purely statistical criteria. Platform dependence is specified as an exogenous structural condition. Pricing power and demand volatility function as mediating mechanisms linking dependence to financial resilience. Occupancy performance is included as a short term outcome to distinguish volume effects from stability effects. Branding capability is modelled as a moderator on the platform dependence to resilience relationship.

Identification relies on sufficient indicator variation, theoretical justification of causal direction, and adequate sample size relative to model complexity. Bootstrapping procedures are used to estimate indirect effects and confidence intervals.

Endogeneity considerations

Three primary sources of endogeneity are addressed.

Reverse causality

Financially resilient firms may be better positioned to invest in branding and direct channels, potentially reducing platform dependence. To address this concern, alternative model specifications reversing the dependence and resilience paths are estimated and compared. Differences in explanatory power and fit are evaluated to assess plausibility.

Omitted variable bias

Control variables include firm size, firm age, subsector, and location centrality within the heritage zone. These controls capture structural heterogeneity that may influence both dependence and outcomes. Including a direct path from platform dependence to financial resilience further reduces omitted pathway distortion.

Common method variance

In addition to procedural remedies, statistical diagnostics are applied. Harman’s single factor test is complemented by full collinearity assessments, recognising that no single test is definitive (Podsakoff et al., 2003). Results are interpreted conservatively.

3.9 Robustness checks

Several robustness checks are conducted to strengthen confidence in the findings.

First, alternative model specifications exclude occupancy performance to test whether the core mediation structure remains stable.

Second, subgroup analyses compare accommodation providers and attraction operators to assess structural consistency across subsectors.

Third, sensitivity tests examine whether results hold when platform dependence is operationalised using alternative item combinations.

Fourth, moderation effects are tested using interaction terms with mean centring to reduce multicollinearity.

These checks align with recent methodological guidance for rigorous SEM application in management and tourism research (Hair et al., 2022).

Ethical considerations

Participation was voluntary and informed consent was obtained. No personal identifiers were collected. Data were analysed in aggregate form only. Ethical procedures complied with institutional research guidelines.

FINDINGS

Sample characteristics and preliminary data screening

The final sample consists of 320 tourism SMEs operating in Melaka. Data screening was conducted prior to model estimation to ensure suitability for structural equation modelling. Missing values were minimal and handled using expectation maximisation. Univariate skewness and kurtosis statistics fell within acceptable ranges, and multivariate outlier diagnostics did not indicate influential observations. These results support the adequacy of the dataset for SEM analysis (Hair et al., 2022; Kline, 2016).

Category	Frequency	Percentage
Business type		

Accommodation providers	214	66.9
Attraction operators	106	33.1
Firm size (employees)		
Micro (1–4)	98	30.6
Small (5–29)	173	54.1
Medium (30–74)	49	15.3
Firm age		
Less than 5 years	71	22.2
5–10 years	112	35.0
More than 10 years	137	42.8
Booking mix		
>50% bookings via platforms	231	72.2
≤50% bookings via platforms	89	27.8

The profile confirms a strong reliance on digital platforms across the destination, supporting the relevance of the research context.

Descriptive statistics and correlations

Table 4.2 reports the descriptive statistics and Pearson correlations for all latent constructs. Platform dependence is positively correlated with occupancy performance and demand volatility, and negatively correlated with pricing power and financial resilience. Pricing power exhibits a strong negative association with demand volatility and a strong positive association with financial resilience.

Table 4.2 Descriptive statistics and correlations

Construct	Mean	SD	1	2	3	4	5	6
1 Platform dependence (PD)	4.98	1.12	1.00					
2 Occupancy performance (OP)	5.12	0.98	0.32	1.00				
3 Pricing power (PP)	4.21	1.07	-0.39	-0.08	1.00			
4 Demand volatility (DV)	4.66	1.09	0.28	0.14	-0.44	1.00		
5 Financial resilience (FR)	4.37	1.03	-0.31	-0.06	0.52	-0.55	1.00	
6 Branding capabilities (BC)	4.58	1.01	-0.17	0.19	0.41	-0.29	0.45	1.00

The correlation pattern is theoretically consistent with the proposed causal structure and does not indicate problematic multicollinearity.

Assessment of common method variance

Given the single respondent survey design, both procedural and statistical remedies were applied to address common method variance. Procedural steps included anonymity assurance, construct separation, and neutral wording. Statistically, a single factor CFA model was estimated and compared with the hypothesised measurement model.

Table 4.3 Model comparison for common method variance assessment

Model	χ^2	df	CFI	TLI	RMSEA	SRMR
Single factor model	1896	252	0.61	0.57	0.142	0.119
Six factor measurement model	476	237	0.95	0.94	0.056	0.047
Six factor model with common latent factor	431	221	0.96	0.95	0.054	0.045

The substantial improvement in model fit supports the absence of a dominant common method factor (Podsakoff et al., 2003).

Measurement model evaluation

Confirmatory factor analysis and model fit

The six-factor measurement model was estimated using CFA. Model fit indices indicate good fit according to conventional thresholds.

$$\begin{aligned} \chi^2 &= 476, & df &= 237, & \chi^2/df &= 2.01 \\ CFI &= 0.95, & TLI &= 0.94 \\ RMSEA &= 0.056, & SRMR &= 0.047 \end{aligned}$$

These results support the adequacy of the measurement structure (Hair et al., 2022).

Indicator loadings

All standardised factor loadings exceed 0.70 and are statistically significant, indicating strong indicator reliability.

Construct	Item	Loading
Platform dependence	PD1	0.82
	PD2	0.86
	PD3	0.79
	PD4	0.84
Occupancy performance	OP1	0.78
	OP2	0.74
	OP3	0.81
	OP4	0.77

Pricing power	PP1	0.83
	PP2	0.85
	PP3	0.80
	PP4	0.76
Demand volatility	DV1	0.84
	DV2	0.88
	DV3	0.81
	DV4	0.79
Financial resilience	FR1	0.86
	FR2	0.88
	FR3	0.83
	FR4	0.79
Branding capability	BC1	0.81
	BC2	0.84
	BC3	0.78
	BC4	0.76

Table 4.4 Standardised factor loadings

4.4.3 Reliability and convergent validity

Composite reliability and average variance extracted values exceed recommended thresholds, supporting convergent validity.

Construct	Cronbach's α	CR	AVE
Platform dependence	0.86	0.90	0.69
Occupancy performance	0.81	0.86	0.60
Pricing power	0.85	0.89	0.67
Demand volatility	0.87	0.91	0.71
Financial resilience	0.88	0.92	0.74
Branding capability	0.82	0.87	0.62

Table 4.5 Reliability and convergent validity

Discriminant validity

Discriminant validity was assessed using heterotrait–monotrait ratios.

Construct pair	HTMT
PD–PP	0.44
PD–DV	0.31
PD–FR	0.35
PD–BC	0.22
PP–DV	0.52
PP–FR	0.62
PP–BC	0.49
DV–FR	0.66
FR–BC	0.51

Table 4.6 HTMT ratios

All values fall below conservative thresholds, supporting discriminant validity (Henseler et al., 2015).

Structural model results

Model fit and explanatory power

The structural model demonstrates acceptable fit.

$\chi^2 = 512, df = 251, \chi^2/df = 2.04$

CFI = 0.94, TLI = 0.93

RMSEA = 0.057, SRMR = 0.051

Explained variance values indicate substantial explanatory power.

R² occupancy performance = 0.11

R² pricing power = 0.24

R² demand volatility = 0.35

R² financial resilience = 0.48

Direct effects and hypothesis testing

Path	Std β	SE	z	p	Result
PD → OP	0.33	0.06	5.50	<0.001	Supported (H1)

PD → PP	-0.37	0.06	-6.17	<0.001	Supported (H2)
PP → DV	-0.42	0.06	-7.00	<0.001	Supported (H3)
DV → FR	-0.49	0.06	-8.17	<0.001	Supported (H4)
PD → FR	-0.18	0.06	-3.00	0.003	Partial mediation

Table 4.7 Structural path estimates

The results confirm that platform dependence increases short term occupancy but undermines pricing autonomy and financial stability through increased volatility.

Mediation analysis

Bootstrapping with 5,000 resamples was used to test indirect effects.

Indirect path	Std effect	95% CI lower	95% CI upper
PD → PP → FR	-0.11	-0.17	-0.06
PD → PP → DV → FR	-0.08	-0.12	-0.05
PD → DV → FR	-0.05	-0.09	-0.02
Total indirect effect	-0.24	-0.31	-0.18
Total effect PD → FR	-0.42	-0.50	-0.34

Table 4.8 Bootstrapped mediation results

The mediation analysis supports a sequential mechanism linking dependence, pricing erosion, volatility, and resilience loss.

Moderation analysis

Branding capability was tested as a moderator of the platform dependence–financial resilience relationship.

Predictor	Std β	SE	z	p
Platform dependence	-0.15	0.06	-2.50	0.012
Branding capability	0.27	0.05	5.40	<0.001
PD × BC interaction	0.14	0.05	2.80	0.005

Table 4.9 Moderation results

Branding capability level	Effect	95% CI lower	95% CI upper
Low (-1 SD)	-0.29	-0.39	-0.18
High (+1 SD)	-0.06	-0.16	0.05

Table 4.10 Conditional effects of platform dependence on financial resilience

Branding capability significantly weakens dependence related vulnerability.

Robustness checks

Multiple robustness checks were conducted.

Test	Outcome
Alternative model excluding OP	Core paths unchanged
Subsector comparison	Structural paths stable
Expanded controls	No coefficient reversal
Common latent factor	Results unchanged
Reversed causality model	Inferior fit

Table 4.11 Robustness summary

DISCUSSION

Overview of key findings and interpretive lens

The results reveal a clear trade off embedded in platform mediated tourism markets. Platform dependence is associated with stronger short term occupancy performance, but it simultaneously erodes pricing power and increases demand volatility, which ultimately weakens financial resilience. Branding capability reduces this vulnerability, such that the negative association between platform dependence and resilience becomes substantially weaker among firms with stronger branding resources.

This pattern aligns with the core proposition of platform ecosystem theory that platforms restructure markets by controlling visibility rules and transaction conditions (Parker et al., 2016; Kenney & Zysman, 2020). It also echoes resource dependence theory, which predicts autonomy loss when critical resources are controlled externally (Pfeffer & Salancik, 1978). Importantly, the findings place volatility and resilience at the centre of the platform dependence debate rather than treating platforms only as distribution tools.

The occupancy gain is real, but it is not the same as resilience

The positive association between platform dependence and occupancy performance supports the widely observed efficiency logic of platforms. Platforms reduce search frictions, provide trust signals, and accelerate matching between demand and supply. For tourism SMEs with limited marketing capabilities, this produces immediate booking gains that can be mistaken as sustainable growth.

A critical implication is that occupancy performance is an incomplete indicator of economic health in platform markets. Higher occupancy can coexist with weaker margins, greater operational strain, and higher exposure to algorithmic shocks. This distinction matters because platform governance often encourages volume oriented strategies through ranking incentives, conversion metrics, and competitive pricing signals. The performance benefit therefore reflects access and exposure, not necessarily strategic strength or financial robustness (Parker et al., 2016; Zhou et al., 2024).

This helps explain why destinations can appear to be performing well on visitor metrics while SMEs report persistent fragility. The result is a form of “growth without resilience”, where demand is captured but not secured.

Pricing power as the central mechanism of platform induced fragility

The negative relationship between platform dependence and pricing power is the structural hinge of the model. In platform mediated markets, pricing is shaped by three forces that disadvantage SMEs.

First, platform commission structures and fee practices reduce net retained revenue, pushing firms toward volume strategies rather than margin optimisation. Second, price transparency makes undercutting easier and differentiation harder. Third, algorithmic ranking systems frequently reward conversion and competitiveness, creating pressure to discount to maintain visibility.

These mechanisms are consistent with resource dependence theory because the platform controls the terms of access to demand and can indirectly shape supplier behaviour without formal contracts governing pricing decisions (Pfeffer & Salancik, 1978; Kenney & Zysman, 2020). The empirical results support the interpretation that the platform relationship functions as a governance regime, not merely a distribution channel.

From a critical perspective, pricing power erosion should be treated as a strategic cost of platform dependence. When pricing autonomy weakens, firms lose their capacity to stabilise revenue across demand cycles. This shifts risk from platforms to suppliers. Platforms retain flexibility, while SMEs absorb volatility.

Demand volatility as an amplification outcome rather than simple seasonality

Demand volatility is not merely an extension of normal tourism seasonality. The mediation results indicate that volatility increases as pricing power declines, consistent with the idea that firms become more exposed to platform driven promotional cycles and competitive price wars. In addition, algorithmic visibility can reallocate demand quickly, producing instability even when overall destination demand remains stable.

This aligns with complexity and overtourism research that emphasises digital amplification of visitor concentration patterns. Digital platforms and social media visibility can intensify peaks and deepen troughs through recommendation feedback loops and attention cascades, especially in compact heritage destinations where capacity constraints create sharp congestion thresholds (Milano et al., 2022; Sigala, 2024). Under such conditions, volatility becomes a system property that is transmitted to firms through platform ranking dynamics and consumer attention flows.

A critical implication is that volatility is partly produced by the governance logic of platforms. Volatility is not only an external shock. It can be an endogenous outcome of platform mediated competition.

Financial resilience is primarily shaped by stability rather than growth

Demand volatility shows the strongest negative association with financial resilience. This reinforces the resilience literature, which treats stability, liquidity, and shock absorption capacity as the foundations of survival, particularly for SMEs with limited buffers (Prayag et al., 2024). It also clarifies why strategies that maximise occupancy at the expense of margin quality can be financially dangerous.

Volatility undermines resilience through predictable channels: unstable cash flow, working capital strain, and heightened exposure to cost rigidity. Tourism SMEs often face fixed or semi fixed costs related to rent, utilities, labour retention, and maintenance. When demand becomes less predictable, the ability to smooth costs declines. Even if annual revenue remains acceptable, short term instability can cause financial stress.

The model therefore reframes resilience as the ability to sustain operational functioning under unstable demand regimes rather than the ability to grow rapidly in good periods. This distinction is central for destination governance because it shifts attention from headline tourism growth toward the financial durability of the supplier base.

Branding capability as a buffer against platform dependence traps

The moderation results indicate that branding capability substantially weakens the negative association between platform dependence and resilience. This is consistent with the resource based view, where intangible resources such as brand equity, recognition, and loyalty provide defensive value and enable strategic autonomy (Barney, 1991). Branding capability can reduce dependence risk through two pathways.

First, it increases the feasibility of direct demand generation, reducing reliance on platform controlled visibility. Second, it supports differentiation and price premium potential, mitigating margin erosion and reducing the need to discount for algorithmic ranking.

Critically, the moderation findings imply that not all SMEs experience platform dependence in the same way. Platform dependence is most damaging for firms that rely on platforms as their primary identity and distribution system. When branding capability is weak, the firm is effectively commoditised within the platform interface, making it highly substitutable. Commoditisation is the mechanism that converts platform exposure into fragility.

This suggests a stratified platform economy. High capability firms use platforms as supplementary channels and remain resilient. Low capability firms become locked into platform logic and absorb volatility.

Theoretical contributions

Extending platform ecosystem theory to resilience outcomes

The study advances platform ecosystem theory by demonstrating that platform dependence influences not only market access and performance but also resilience relevant outcomes through pricing autonomy and volatility. This extends the platform discussion beyond efficiency and adoption toward vulnerability and risk transmission (Parker et al., 2016; Kenney & Zysman, 2020).

Integrating resource dependence logic into tourism platform research

The findings operationalise a clear dependence to autonomy mechanism in tourism SMEs: higher dependence reduces pricing power, which increases volatility and weakens financial resilience. This positions pricing power as an intermediate governance outcome through which platforms shape firm stability (Pfeffer & Salancik, 1978).

Linking overtourism amplification to firm fragility

Overtourism research often focuses on resident and environmental outcomes. The current evidence adds a firm level fragility dimension by showing how digitally amplified demand regimes translate into volatility and reduced resilience among SMEs. This builds a bridge between overtourism and financial sustainability debates (Milano et al., 2022; Sigala, 2024).

Alternative explanations and critical evaluation of the evidence

Several competing explanations warrant attention, particularly in cross sectional survey research.

First, reverse causality remains plausible. Financially resilient firms may invest more in branding and direct channels, reducing platform dependence. The presence of sequential mediation and a significant moderation effect supports the proposed structure, but causal claims should remain bounded to theory consistent associations unless strengthened by longitudinal or quasi experimental designs (Hair et al., 2022).

Second, location centrality may shape both platform dependence and volatility. Firms located in the heritage core may be more visible, more dependent on platforms, and more exposed to fluctuating visitor flows. Controls reduce this risk, yet residual confounding cannot be eliminated fully.

Third, service quality may influence reviews and ranking, which then influences both dependence and performance. This is not a nuisance variable. It is part of the platform mechanism. However, it complicates

interpretation because high quality firms may receive stable demand and better resilience even under dependence.

A critical reading therefore treats the results as evidence of structural tendencies rather than deterministic outcomes. Platform dependence increases fragility risk on average, particularly where branding capability is weak.

Managerial implications for tourism SMEs in Melaka

Rebalance from occupancy maximisation to stability management

Revenue management practices should prioritise stability and margin quality rather than occupancy alone. Discounting to preserve ranking may produce a volatility trap: short term volume gains followed by margin erosion and increased demand instability.

Build brand assets that reduce substitutability

Branding capability is not limited to logos and social media content. It includes a distinct value proposition, repeat visitation mechanisms, and relationship assets that support direct demand. Loyalty programmes, partnerships with niche communities, and consistent experience design can increase recognition and reduce commoditisation (Barney, 1991).

Diversify channels and strengthen direct booking infrastructure

Channel diversification is a resilience strategy. Dependence risk rises sharply when one or two platforms dominate bookings. Direct booking systems, customer databases, and post visit relationship management help reduce exposure to platform rule changes and ranking shocks.

Policy and destination governance implications

Shift destination policy from algorithm driven exposure to capability building

Tourism promotion strategies that rely heavily on digital campaigns and platform partnerships can unintentionally reinforce dependence. Capability based competitiveness should be prioritised, including SME training in brand building, data literacy, and direct channel development.

Address volatility as a destination sustainability issue

Demand volatility affects labour conditions, service quality, and local congestion patterns. Destination management should treat volatility reduction as part of sustainability policy rather than leaving it to firm level adaptation. This aligns with the broader shift in tourism governance toward resilience oriented management (Sigala, 2024; Prayag et al., 2024).

Create governance instruments that reduce dependency risks

Practical interventions include support for destination owned booking platforms, shared customer relationship infrastructure, and standards for transparent platform practices. Even where regulatory authority is limited, destination actors can reduce collective dependence by enabling shared capabilities and alternative distribution options.

CONCLUSION

Recap of research purpose and approach

This study examined how reliance on digital platforms shapes the resilience of tourism SMEs in Melaka. The core objective was to move beyond a narrow performance framing and test whether platform dependence

produces structural vulnerability through reduced pricing power and heightened demand volatility, while also assessing whether branding capability can buffer these risks. The empirical model integrated platform ecosystem theory and resource dependence logic to explain how algorithm mediated exposure can generate short term occupancy gains yet weaken longer term financial stability (Parker et al., 2016; Pfeffer & Salancik, 1978; Kenney & Zysman, 2020).

Using a quantitative design and SEM estimation, the study provided a mechanism based explanation that connects distribution reliance to stability outcomes. The modelling strategy allowed simultaneous assessment of direct effects, sequential mediation, and moderation effects in a single coherent structure, consistent with best practice in latent variable analysis (Hair et al., 2022).

Consolidated conclusions from empirical findings

Three conclusions follow directly from the empirical evidence.

First, platform dependence is associated with improved short term occupancy performance. This confirms that platforms deliver real market access benefits by reducing customer acquisition friction and converting visibility into bookings. The result is consistent with the platform efficiency argument commonly cited in the tourism distribution literature (Zhou et al., 2024).

Second, platform dependence weakens pricing power. Reduced pricing autonomy is the pivotal mechanism that transforms platform reliance into fragility. As autonomy erodes, firms become more exposed to platform driven discount pressure, commission structures, and highly transparent price competition. This finding aligns with resource dependence theory's central proposition that reliance on external actors controlling critical resources reduces strategic discretion (Pfeffer & Salancik, 1978).

Third, reduced pricing power increases demand volatility, and volatility undermines financial resilience. This indicates that instability is not merely a background condition of tourism seasonality but a structurally amplified outcome in platform mediated markets. It also clarifies why occupancy metrics alone can be misleading, because volume gains can coexist with unstable cash flow and weak shock absorption. The pattern strengthens the argument that resilience is primarily shaped by stability and liquidity rather than growth during peak periods (Prayag et al., 2024).

A further conclusion concerns heterogeneity. Branding capability weakens the negative dependence to resilience relationship. Firms that develop recognition, loyalty, and direct booking capacity are less likely to fall into a dependence trap. This supports the resource based view that intangible capabilities offer defensive value under adverse competitive governance conditions (Barney, 1991).

Theoretical contributions

Reframing platform dependence as a resilience relevant construct

Tourism platform research often emphasises adoption, performance, or consumer behaviour outcomes. The current study advances the literature by positioning platform dependence as a determinant of resilience, not merely distribution efficiency. The model demonstrates that dependence has both enabling and destabilising effects, which must be evaluated together.

This contribution strengthens platform ecosystem theory in tourism by showing that platforms do not simply intermediate transactions. They shape the risk structure of the market through governance, visibility rules, and competitive incentives that redistribute volatility toward suppliers (Parker et al., 2016; Kenney & Zysman, 2020).

Explaining vulnerability through pricing power and volatility mechanisms

The study offers a mechanism based explanation that is often missing in platform discussions. Pricing power is shown to function as the strategic hinge between dependence and volatility. This brings resource dependence

theory into the tourism platform debate with measurable pathways rather than abstract power arguments (Pfeffer & Salancik, 1978).

By empirically linking pricing autonomy to volatility and resilience, the study also contributes to tourism resilience scholarship, which increasingly calls for explanations that integrate market structure and governance conditions rather than focusing only on firm level capabilities (Prayag et al., 2024).

Connecting digital amplification and destination fragility

Overtourism research tends to foreground social and environmental impacts. This study adds a financial sustainability dimension by illustrating how digitally mediated demand regimes can contribute to fragility among SMEs. When volatility rises, destination quality and service continuity are at risk, because SMEs respond through cost cutting, labour instability, and reduced maintenance investment. This strengthens the argument that destination sustainability should include supplier base resilience as a core policy concern (Milano et al., 2022; Sigala, 2024).

Managerial implications for tourism SMEs

Shift strategic focus from volume to stability

The results suggest that occupancy maximisation can create a false sense of success. SMEs should prioritise margin quality, cash flow predictability, and channel balance. In practice, this requires reducing discount dependence, adopting disciplined revenue management, and evaluating promotions based on net contribution rather than booking volume.

Build pricing autonomy through differentiation

Pricing power is not only a function of market demand. It reflects differentiation capacity and perceived value. SMEs should strengthen service distinctiveness, package design, and experience consistency to justify premiums even within price transparent platforms. This is particularly important in heritage destinations, where authenticity and service quality can be developed as defensible positioning.

Invest in branding capability as a resilience asset

Branding capability functions as a buffer because it reduces substitutability. Practical actions include building repeat visitation mechanisms, developing identifiable niche positioning, improving post visit relationship management, and strengthening direct booking infrastructure. The point is not to abandon platforms but to reduce single channel exposure and regain partial control over demand.

Policy and destination governance implications

Rebalance tourism strategy away from algorithm dependent growth

Destination marketing policies that focus primarily on digital exposure may unintentionally intensify dependence and volatility. A resilience oriented strategy should shift emphasis toward capability building, including SME training in branding, data literacy, and direct customer relationship development. This aligns with contemporary tourism governance thinking that prioritises resilience and adaptive capacity in destination systems (Sigala, 2024).

Manage volatility as part of sustainable tourism policy

Volatility influences congestion patterns, labour conditions, and service quality. Destination management should treat demand smoothing and flow distribution as governance objectives. This may involve event scheduling strategies, visitor dispersion policies, and support for product diversification beyond the heritage core.

Build shared infrastructure that reduces dependency

Where individual SMEs cannot invest in sophisticated systems, destination level shared tools can reduce dependence. Examples include destination owned booking portals, shared CRM initiatives, and cooperative branding programmes that strengthen collective visibility outside dominant platforms. Such policies reduce correlated exposure and support destination level resilience.

Limitations

Several limitations should be acknowledged to frame interpretation appropriately.

First, the design is cross sectional. While the model is theory grounded and includes mediation and moderation logic, causal inference remains limited compared with longitudinal or quasi experimental designs (Hair et al., 2022).

Second, measures are survey based. Although validity diagnostics support construct quality, subjective reporting may introduce perception bias. This is common in SME research where audited financial data are difficult to obtain.

Third, the context is destination specific. Melaka is a heritage destination with particular spatial constraints and demand concentration dynamics. Generalisability to other destinations should be tested through comparative research.

Fourth, platform dependence can vary by platform type. OTA dependence and social media dependence may operate differently. A finer grained platform taxonomy could improve explanatory precision.

Future research directions

Four directions are especially important for advancing this research stream.

Longitudinal designs and event based analysis

Future work should employ panel data across multiple periods to test whether platform dependence predicts changes in volatility and resilience over time. Event based designs could examine the effects of platform algorithm changes, policy changes, or demand shocks on SME outcomes.

Objective financial indicators and mixed data sources

Combining survey data with financial statements, tax records, or bank transaction proxies would strengthen validity. Alternative data sources such as web traffic analytics and booking channel data could also reduce common method concerns.

Multi destination comparative studies

Testing the model across multiple heritage destinations would identify boundary conditions. Factors such as destination carrying capacity, visitor mix, and platform concentration levels may moderate the dependence to fragility relationship.

Platform governance variables and institutional context

Future studies should incorporate platform governance variables such as commission rates, parity clauses, review policy strictness, and paid visibility intensity. Institutional context also matters, as regulatory capacity and tourism governance structure can shape dependence risks.

Final conclusion

Digital platforms are now essential infrastructure in tourism destinations, but their benefits are not neutral. The evidence indicates that platform dependence can increase short term occupancy while weakening pricing power, amplifying demand volatility, and reducing financial resilience among tourism SMEs. Branding capability provides a meaningful buffer, suggesting that capability based competitiveness is a more durable foundation for destination development than algorithm driven exposure.

For Melaka, the implication is direct. Tourism policy and SME strategy should not treat platform growth as a proxy for resilience. The priority should be rebuilding pricing autonomy, diversifying demand channels, and strengthening brand based demand to reduce fragility at both firm and destination levels.

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Conflict of Interest

The authors declare no conflict of interest with respect to the research, authorship, and publication of this article.

Use of Artificial Intelligence

Artificial intelligence tools were used in a limited and transparent manner to support language refinement, clarity, and structural consistency of the manuscript. All theoretical development, research design, data interpretation, and substantive intellectual contributions were carried out by the authors. The authors take full responsibility for the content, originality, and integrity of the manuscript.

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