

***Digital Lending and Over-Indebtedness Risk: Evidence from Indonesian MSMEs*****Pinjaman Digital dan Risiko *Over-Indebtedness*: Studi pada UMKM Indonesia**Rusnathul Amiah¹, Muhammad Saleh², Ilham Safar³^{1,2}*Department of Management, STIE Pelita Buana*³*Department of Management, Universitas Fajar*rusnathulamiah2812@gmail.comsaleh.saing@gmail.comilhamsafar@unifa.ac.id***Abstract***

This study aims to examine the serial mediation role of business financial pressure and over-indebtedness risk in transmitting the effect of digital lending characteristics on MSME business survival. A quantitative explanatory design was employed with 200 MSME operators who actively use digital lending products, sampled through purposive sampling. Data were analyzed using PROCESS Macro Model 6 with 10,000 bootstrap subsamples and a 95% confidence interval. Results indicate that digital lending characteristics significantly exacerbate business financial pressure, which in turn drives over-indebtedness risk, while the direct effect on business survival is fully absorbed by the mediation chain. Serial mediation is confirmed as significant ($IE3 = 0.335$; 95% CI [0.231, 0.458]), with the two-stage sequential pathway emerging as the dominant transmission mechanism, surpassing both single-mediator paths. These findings support Debt Trap Theory and Pecking Order Theory, demonstrating that the harm of digital lending operates progressively rather than directly. Effective policy interventions should target both platform design regulation and structural improvements to MSME access to formal financing.

Keywords: Digital Lending; Financial Pressure; Over-indebtedness; Business Survival**Abstrak**

Penelitian ini bertujuan menguji peran mediasi serial tekanan keuangan usaha dan risiko *over-indebtedness* dalam mentransmisikan pengaruh karakteristik pinjaman digital terhadap kelangsungan usaha UMKM. Desain penelitian kuantitatif eksplanatori diterapkan terhadap 200 pelaku UMKM pengguna pinjaman digital yang dipilih melalui *purposive sampling*. Analisis data menggunakan PROCESS Macro Model 6 dengan 10.000 subsampel *bootstrap* dan *confidence interval* 95%. Hasil penelitian menunjukkan bahwa karakteristik pinjaman digital secara signifikan memperburuk tekanan keuangan usaha, yang kemudian mendorong risiko *over-indebtedness*, sementara efek langsung terhadap kelangsungan usaha sepenuhnya diserap oleh rantai mediasi. Mediasi serial terkonfirmasi signifikan ($IE3 = 0,335$; CI 95% [0,231; 0,458]), dengan jalur dua tahap berurutan sebagai mekanisme transmisi paling dominan, melampaui kedua jalur mediasi tunggal. Temuan ini mendukung *Debt Trap Theory* dan *Pecking Order Theory*, menunjukkan bahwa dampak pinjaman digital bekerja secara

progresif, bukan langsung. Intervensi kebijakan yang efektif perlu menysasar regulasi desain platform sekaligus penguatan akses UMKM terhadap pembiayaan formal.

Kata Kunci: Pinjaman Digital; Tekanan Keuangan; Kelebihan Hutang; Kelangsungan Usaha

INTRODUCTION

Micro, Small, and Medium Enterprise (MSME) sector serves as the backbone of the Indonesian economy. Data from Central Statistics Agency (BPS, 2023) and the Ministry of Cooperatives and SMEs (Kemenkop UKM, 2024) record 64.2 million MSME units contributing 61% of GDP (IDR 9,580 trillion), absorbing 117 million workers (97% of the national workforce), and accounting for 99% of all national business units. Despite this pivotal role, MSMEs face structural barriers to financing: limited collateral, minimal financial track records, and lengthy formal banking procedures (World Bank, 2024). Consistent with Pecking Order Theory (Myers & Majluf, 1984), MSMEs tend to resort to high-cost external financing when internal funds and formal credit are unavailable. It is in this context that digital lending emerges as a promising vehicle for financial inclusion, while simultaneously introducing new risks that warrant rigorous scholarly investigation.

Indonesia represents the largest peer-to-peer (P2P) lending market in ASEAN. Financial Services Authority (OJK) data (2024) record total active outstanding digital lending balances reaching IDR 74.48 trillion as of September 2024, representing a year-on-year increase of 30.8%, with MSMEs accounting for 38.39% of this figure. Cumulatively, Indonesia Fintech Lending Association (AFPI, 2025) reports that 97 licensed platforms have disbursed IDR 978 trillion to 137 million borrowers since 2017. The primary appeal of digital lending to MSMEs lies in rapid disbursement, minimal collateral requirements, and alternative data-based credit scoring. The World Bank (2024) notes that 30% of Indonesian MSMEs had never accessed formal credit prior to their first interaction with fintech platforms, underscoring the substantial financial inclusion potential offered by digital channels.

Alongside this convenience, the rapid growth of digital lending is accompanied by a serious risk: over-indebtedness, or the excessive accumulation of debt obligations. Hamid (2025) defines over-indebtedness as the inability to meet debt obligations without sacrificing minimum living or operating standards. OJK data (2024) indicate that 21 licensed P2P lending platforms recorded a 90-day non-performing loan ratio (TWP90) above 5% as of November 2024, and the aggregate TWP90 ratio increased from 2.78% (February 2025) to 4.38% (January 2026), reflecting a troubling deterioration in borrower repayment capacity (OJK, 2026). For MSMEs, this condition extends beyond a personal financial problem; it represents a direct threat to business survival through debt spirals and cash flow disruptions (Sudrajad, 2026). A study in North Sulawesi confirmed the existence of risk awareness gaps among MSME operators using online lending platforms (Astuti & Kholidah, 2024).

The fundamental determinants of this condition are rooted in the inherent characteristics of digital lending products themselves. Suryono et al. (2021) identify that

platform designs prioritizing speed over adequate credit assessment represent the systemic root cause of high default rates in Indonesia. Furthermore, the lack of transparency regarding total borrowing costs frequently leaves MSMEs unaware of their true financial burden (Abdullah et al., 2026). Aggressive and unethical collection practices add a further layer of direct threat to business operations (OJK, 2024). Schicks (2013), in Debt Trap Theory, asserts that poorly designed credit products inherently create debt traps for vulnerable borrowers, a condition highly relevant within Indonesia's digital lending landscape, where regulation continues to evolve.

These exploitative digital lending characteristics operate through a progressive, multi-stage transmission mechanism. The problematic features of digital lending product design, including opaque interest structures, instant disbursement without credit analysis, and aggressive collection practices, directly exacerbate the already fragile financial conditions facing MSME operations (Suryono et al., 2021). Installment obligations inflated by hidden penalty charges erode cash flow, while automatically escalating credit limits encourage additional borrowing to cover emerging deficits. Within the framework of Pecking Order Theory (Myers & Majluf, 1984), mounting financial pressure drives MSMEs to rely once again on digital lending as a last resort, creating a spiral that progressively accumulates debt until the condition of over-indebtedness is reached. Financial pressure Theory (Altman, 1968) explains that the resulting over-indebtedness then materially damages operational capacity and threatens the long-term survival of MSMEs (Beck & Demirgüç-Kunt, 2008).

Several prior studies have examined this phenomenon but have left significant gaps unaddressed. Suryono et al. (2021) mapped P2P lending issues qualitatively without constructing a quantitative causal model. Warokka et al. (2025) tested determinants of over-indebtedness using PLS-SEM, but focused narrowly on individual behavioral biases without investigating the transmission mechanisms of digital lending product characteristics. Hamid (2025) analyzed over-indebtedness among individual consumers in Malaysia rather than MSMEs as business entities. Astuti and Kholidah (2024) described MSME perceptions using a descriptive approach without a causal model, while Abdullah et al. (2026) employed a comparative regulatory approach without empirical survey data. Crucially, no study to date has tested a purely sequential causal chain in which digital lending characteristics operate progressively, first deteriorating business financial pressure, which then drives over-indebtedness risk, which ultimately threatens MSME business survival, within a single integrated serial double mediation model.

This study addresses that gap by constructing a pure sequential double mediation model that tests the effect of digital lending characteristics on MSME business survival through two serial mediators, namely business financial pressure and over-indebtedness risk, using PROCESS Macro Model 6 (Hayes, 2022) via SPSS. The primary theoretical contribution lies in testing a purely serial mediation pathway, asserting that digital lending characteristics do not directly affect business survival through isolated mediators, but must traverse the entire transmission chain sequentially. Theoretically, this study integrates Debt Trap Theory (Schicks, 2013), Pecking Order Theory (Myers & Majluf, 1984), and financial pressure Theory (Altman, 1968) into a single cohesive causal framework. At a time of rising TWP90

ratios and increasing MSME vulnerability to digital debt traps, this evidence-based study constitutes both an urgent scholarly response and a policy foundation for OJK and the Ministry of Cooperatives and SMEs.

LITERATURE REVIEW AND HYPOTHESES

Digital Lending Characteristics

Digital Lending Characteristics refer to the inherent attributes of technology-based lending products that can structurally encourage or exacerbate over-borrowing behavior. Saepul Alam (2023) identifies five characteristics of digital lending: the transaction platform, application process, interest rates and fees, information disclosure, and security. Suryono et al. (2021) assert that ease of access without adequate credit assessment constitutes the systemic root cause of high default rates in the P2P lending industry. OJK (2024), through OJK Regulation (POJK) No. 40/2024, defines digital lending characteristics across four regulatory dimensions: disbursement mechanisms, limits on economic benefits, information transparency, and collection practices. Based on this synthesis, the present study defines digital lending characteristics as the inherent features of digital lending products encompassing the dimensions of ease of access, cost transparency, collection aggressiveness, and automatic credit limit escalation.

Business Financial Pressure

Business Financial pressure is a condition in which a business entity faces financing constraints that impede its operational capacity and investment activities. Myers and Majluf (1984), through Pecking Order Theory, explain that financial pressure arises when a business is unable to access low-cost financing sources and is consequently forced to resort to high-cost external financing as a last resort. Fazzari et al. (1988) define *financial constraints* as conditions in which limitations in internal cash flow significantly restrict a business's operational and investment capacity. Beck and Demirgüç-Kunt (2008) identify three dimensions of MSME financial pressure: constraints on access to formal capital, revenue volatility, and inability to meet financial institution requirements. Based on this synthesis, this study defines business financial pressure as a condition in which MSMEs experience liquidity deficits, barriers to formal financing access, and revenue instability.

Over-Indebtedness Risk

Over-Indebtedness Risk refers to a condition in which a borrower's debt burden exceeds a reasonable repayment capacity. D'Alessio and Iezzi (2013) define it as a situation in which the existing and expected resources of a business are insufficient to meet its financial commitments without reducing its standard of living or operational standards. Schicks (2013) defines over-indebtedness as the excessive sacrifices made by borrowers to fulfill loan obligations, including reductions in consumption, asset transfers, and neglect of basic needs. Betti et al. (2007) operationalize over-indebtedness through four criteria: (1) a high debt service-to-income ratio, (2) arrears, (3) excessive credit use, and (4) an onerous debt burden. This study defines over-indebtedness risk as the condition in which the digital debt burden of MSMEs exceeds a reasonable repayment capacity, measured through six indicators covering debt ratios, multiple borrowing, and borrow-close-reborrow patterns.

MSME Business Survival

MSME Business survival refers to a business’s ability to sustain its operations and meet its financial obligations over the long term. Beaver (1966) defines it as an entity’s capacity to fulfill all financial obligations using operating cash flows without defaulting. Altman (1968) measures business survival through a combination of financial ratios reflecting liquidity, profitability, leverage, and operational efficiency, with financially healthy entities exhibiting higher survival probabilities. Kim (2011) defines *business survival* as the capacity of a business to remain in operation and generate economic value despite facing financial pressure. Based on this synthesis, this study defines MSME business survival as the ability to maintain operational stability, meet financial obligations, and sustain growth capacity even while carrying a digital debt burden.

Based on the foregoing literature review, the conceptual framework and research hypotheses are formulated as follows:

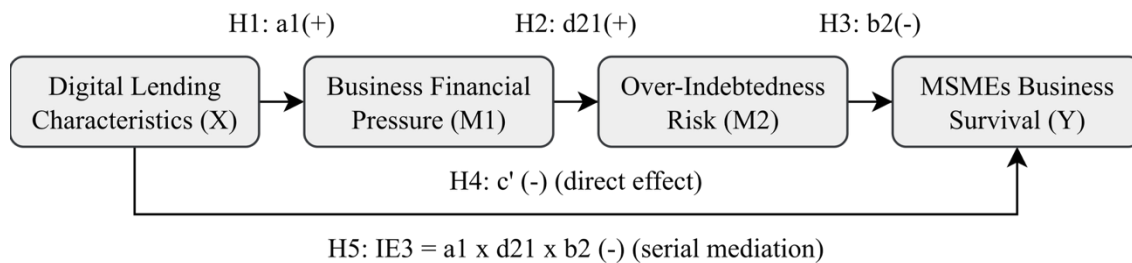


Figure 1. Research Framework

Source: Constructed by the researchers (2026)

H1: Digital lending characteristics have a significant positive effect on MSME business financial pressure.

H2: Business financial pressure has a significant positive effect on over-indebtedness risk.

H3: Over-indebtedness risk has a significant negative effect on MSME business survival.

H4: Digital lending characteristics have a significant direct negative effect on MSME business survival.

H5: Business financial pressure and over-indebtedness risk serially mediate the effect of digital lending characteristics on MSME business survival.

RESEARCH METHODS

This study employs a *quantitative explanatory research* approach with a *cross-sectional* design (Creswell, 2014). The cross-sectional design is an observational method that collects data on independent variables (risk factors) and the dependent variable (outcomes) simultaneously at a single point in time. Analysis was conducted using *pure sequential double mediation* through PROCESS Macro Model 6 (Hayes, 2022).

The study population consists of MSME operators in Indonesia who have used or are currently actively using digital lending products within the past two years. The sampling technique applied was *purposive sampling* (Sugiyono, 2019), with the following inclusion criteria: (1) MSMEs that have been actively operating for at least one year; (2) have used at least one digital lending product within the past two years; and (3) are domiciled in Indonesia.

Following Hayes (2022) for serial mediation analysis, this study targeted 200 respondents to ensure the stability of bootstrapping estimates. Data were collected through a structured questionnaire distributed online via *Google Form* between 1 and 12 April 2026, comprising a respondent profile section and 29 measurement items across four variables measured on a five-point Likert scale (1 to 5).

Data analysis was conducted in three sequential stages: (1) instrument quality testing, (2) classical assumption testing, and (3) serial mediation path analysis using PROCESS Macro Model 6 (Hayes, 2022) with 10,000 bootstrap subsamples and a 95% Confidence Interval. The output generates six path coefficients: $a1$ ($X \rightarrow M1$), $d21$ ($M1 \rightarrow M2$), $a2$ ($X \rightarrow M2$), $b1$ ($M1 \rightarrow Y$), $b2$ ($M2 \rightarrow Y$), and c' (the direct effect of X on Y). Paths $a2$ ($X \rightarrow M2$) and $b1$ ($M1 \rightarrow Y$) are estimated automatically by PROCESS but are not formulated as confirmatory hypotheses in this study, given that the model adopts a pure sequential mechanism. Both paths are reported as exploratory findings. Hypothesis testing focuses on paths $a1$, $d21$, $b2$, c' , and the serial indirect effect $IE3 = a1 \times d21 \times b2$.

This study comprises one independent variable (X), two serial mediators ($M1$ and $M2$), and one dependent variable (Y). Table 1 presents a summary of the operationalization of all four variables.

Table 1
Variable Operationalization

Role	Variable	Dimension	Code	Items	Scale	Source
X	Digital Lending Characteristics	Ease of access, Cost transparency, Collection practices, Automatic credit limit escalation	DL1–DL8	8 items	Likert 1-5	Suryono et al. (2021); OJK (2024); Saepul Alam (2023)
M1	Business Financial Pressure	Capital urgency, Formal access constraints, Revenue volatility, Operational burden	BP1–BP7	7 items	Likert 1-5	Myers & Majluf (1984); Beck & Demirgüç-Kunt (2008); Fazzari et al. (1988)
M2	Over-Indebtedness Risk	Debt burden, Loan accumulation, Repayment capacity	OD1–OD6	6 items	Likert 1-5	Betti et al. (2007); D'Alessio & Iezzi (2013); Schicks (2013)
Y	MSME Business Survival	Operational stability, Financial stability, Growth capacity, Reputation	BS1–BS8	8 items	Likert 1-5	Beaver (1966); Kim (2011); Altman (1968)

Source: Compiled from various literature sources (2026)

RESULTS

Respondent Characteristics

Table 2

Respondent Characteristics

Characteristic	Category	n	%
Gender	Male	87	43,5
	Female	113	56,5
Business Sector	Trade/Retail	83	41,5
	Food and Beverage	73	36,5
	Services	24	12,0
	Other	20	10,0
Business Duration	1-3 years	79	39,5
	3-5 years	68	34,0
	More than 5 years	53	26,5
Lending Platform	OJK-Licensed P2P Lending	102	51,0
	Digital KUR / Digital Bank	69	34,5
	Both	29	14,5
Total		200	100

Source: Processed data (2026);

Note: (KUR) a government-subsidized business credit program administered through partnering banks

Table 2 shows that respondents are predominantly female (56.5%), operating in the trade/retail and food and beverage sectors, which are cash-intensive in nature (78% cumulatively), with the majority having operated their businesses for 1 to 5 years (73.5%). These characteristics reflect a group of MSMEs with high working capital needs but limited access to formal financing. In terms of lending platforms, half of the respondents (51%) use OJK-licensed P2P lending as their primary digital financing source, while 14.5% simultaneously use more than one platform, a condition that is particularly relevant to the measurement of over-indebtedness risk in this study.

Validity and Reliability Testing

Table 3 Summary of Validity Test Results

	X		M1		M2		Y		
	DL1	DL2- DL8 (range)	BP1	BP2- BP7 (range)	OD1	OD2- OD6 (range)	BS1	BS2- BS8 (range)	Note
Cal. r	0,806	0,818 - 0,842	0,825	0,846 - 0,864	0,860	0,814 - 0,877	0,825	0,813 - 0,854	All $r \geq$ 0,138 (Valid)
p-val.	0,000	0,000	0,000	0,000	0,000	0,000	0,000	0,000	All $p <$ 0,05 (Valid)

Source: Processed data (2026)

The validity test results in Table 3 indicate that all 29 items across the four research variables (X: 8 items; M1: 7 items; M2: 6 items; Y: 8 items) yielded corrected item-total correlation values (r) ranging from 0.806 to 0.877, all substantially exceeding the critical value of $r\text{-table} = 0.138$, with significance at $p < 0.001$. Accordingly, all research instruments are declared valid and suitable for use as measurement tools in this study (Sugiyono, 2019).

Table 4
Reliability Test Results (Cronbach's Alpha)

No.	Variable	No. of Items	Cronbach's Alpha (α)	Critical Value	Status
1	X_DL	8	0,955	$\alpha > 0,70$	Reliable
2	M1_BP	7	0,956	$\alpha > 0,70$	Reliable
3	M2_OD	6	0,951	$\alpha > 0,70$	Reliable
4	Y_BS	8	0,956	$\alpha > 0,70$	Reliable

Source: Processed data (2026)

The reliability test results in Table 4 show Cronbach's Alpha values of 0.955 for X, 0.956 for M1, 0.951 for M2, and 0.956 for Y. All values fall within the excellent category ($\alpha > 0.90$) based on the classification of George and Mallery (2003), confirming that all research instruments are reliable and internally consistent in measuring their intended constructs.

Classical Assumption Testing

Table 5
Summary of Classical Assumption Test Results

No.	Assumption Test	Method	Key Result	Conclusion
1	Residual Normality	Kolmogorov-Smirnov	$D = 0,037-0,055$; Sig. = 0,200	All residuals are normally distributed
2	Multicollinearity	Tolerance & VIF	Tolerance 0,228-0,327; VIF 3,057-4,385	No multicollinearity detected
3	Heteroscedasticity	Glejser Test	Sig. X=0,112; M1=0,180; M2=0,737	No heteroscedasticity detected

Source: Processed data (2026)

Based on the full set of classical assumption tests, Table 5 demonstrates that all regression analysis prerequisites are satisfied. Residuals across all three models are normally distributed, no problematic correlations exist among predictors, and residual variance is homogeneous across observations. The serial double mediation model using PROCESS Macro Model 6 is therefore valid and appropriate for hypothesis testing in this study.

Descriptive Statistics

Table 6
Descriptive Statistics

Variable	n	Min	Max	Mean	SD	Interpretation
X_DL	200	13	40	3,21	5,585	Moderate
M1_BP	200	7	35	3,25	5,293	Moderate
M2_OD	200	6	30	3,23	4,605	Moderate
Y_BS	200	13	40	3,19	5,625	Moderate

Source: Processed data (2026)

Note: 1.00-1.80 (Very Low); 1.81-2.60 (Low); 2.61-3.40 (Moderate); 3.41-4.20 (High); 4.21-5.00 (Very High).

Table 6 shows that all four variables recorded per-item means clustered in the range of 3.19 to 3.25 on a five-point Likert scale, placing them in the moderate category. These values do not indicate a neutral or safe condition: for M2 (Over-Indebtedness Risk), a mean of 3.23 reflects that the majority of respondents acknowledged carrying a fairly significant installment burden, including indications of payment delays. The data range is notably wide across all variables; the minimum raw score for X is 13 and the maximum is 40 out of a possible total of 40 (8 items), indicating substantial variation in experience among MSME respondents. The highest standard deviation belongs to Y (5.625), suggesting that business survival conditions varied considerably across respondents even though median scores were similar.

Hypothesis Testing Results

Table 7
Summary of Hypothesis Testing Results

H	Path	Variable	Coef. B	t / CI	p / Sig.	Conclusion	Decision
H1	a1	X → M1 (+)	0,783	23,198	< 0,001	Significant; direction (+) consistent with hypothesis	Supported
H2	d21	M1 → M2 (+)	0,553	8,432	< 0,001	Significant; direction (+) consistent with hypothesis	Supported
-	a2*	X → M2 [Exploratory - not a hypothesis]	0,175	2,865	0,005	-	-
H3	b2	M2 → Y (-)	0,772	8,545	< 0,001	Significant; but direction	Not supported

						(+); contrary to hypothesis	
H4	<i>c'</i>	X → Y (-) [direct effect, after controlling mediators]	-0,014	-0,182	p = 0,856	Not significant	Not supported
-	<i>b1*</i>	M1 → Y [Exploratory - not a hypothesis]	0,256	2,750	0,007	-	-
H5	<i>IE3</i>	Serial mediation: X → M1 → M2 → Y	0,335	[0,231—0,458]	CI ≠ 0	Serial mediation significant; direction (+)	Supported

Source: Processed data (2026)

Note: H3 is not supported because the coefficient direction is positive, contrary to the predicted negative direction. Shaded rows (*) are exploratory findings only.

Digital lending characteristics exert a significant positive effect on business financial pressure (B = 0.783; SE = 0.034; t = 23.198; p < 0.001; 95% CI [0.716, 0.849]). The R² value for Model 1 is 0.682, indicating that 68.2% of the variance in business financial pressure is explained by digital lending characteristics. This finding is consistent with Debt Trap Theory (Schicks, 2013): product designs that prioritize speed of disbursement over risk assessment, characterized by opaque interest structures, minimal verification procedures, and automatic credit limit escalation, demonstrably worsen the already constrained financial conditions of MSMEs. H1 Supported.

Business financial pressure exerts a significant positive effect on over-indebtedness risk (B = 0.553; SE = 0.066; t = 8.432; p < 0.001; 95% CI [0.424, 0.683]). The R² value for Model 2 is 0.673, confirming strong predictive capacity. This mechanism is consistent with Pecking Order Theory (Myers & Majluf, 1984): financially constrained MSMEs tend to take on new loans to cover operating deficits, progressively accumulating debt until it exceeds reasonable repayment capacity. H2 Supported.

Over-indebtedness risk exerts a statistically significant effect on MSME business survival, but in a positive direction (B = 0.772; t = 8.545; p < 0.001; 95% CI [0.594, 0.951]), contrary to the negative direction predicted by the hypothesis. Two methodological explanations are proposed. First, survivorship bias: respondents consist of MSMEs that were still actively operating at the time of the survey, so businesses that had already ceased operations as a result of over-indebtedness are not represented. Second, a business activity confound: MSMEs that aggressively access digital lending and therefore score higher on M2 may also be those that are more commercially active, thereby also scoring higher on the business survival measure. The cross-sectional design limits causal inference, and

longitudinal research is recommended to examine this finding more rigorously. H3 Not Supported (direction inconsistent with hypothesis).

The direct effect of digital lending characteristics on MSME business survival is not statistically significant ($B = -0.014$; $t = -0.182$; $p = 0.856$; 95% CI $[-0.161, 0.134]$). The confidence interval spanning zero reinforces this conclusion. The rejection of H4 does not mean that X is unrelated to Y; on the contrary, the total effect is highly significant ($B = 0.657$; $t = 12.264$; $p < 0.001$). What this pattern demonstrates is that the effect of X on Y operates entirely through the mediators. This constitutes full mediation: when M1 and M2 are controlled, the net direct effect of X on Y dissipates, confirming the central role of the mediation chain in this model. H4 Not Supported (not significant).

Serial mediation is confirmed as statistically significant, with $IE3 = 0.335$ and a 95% bootstrap confidence interval of $[0.231, 0.458]$, not including zero (based on 10,000 bootstrap subsamples). Digital lending characteristics affect MSME business survival through a two-stage sequential chain: first deteriorating business financial pressure, which then drives over-indebtedness risk, which in turn affects business survival. Among the three mediation pathways generated by PROCESS, IE3 (the serial path) carries the largest effect (0.335) compared to Ind1 (0.200) and Ind2 (0.135), confirming that the two-stage sequential causal chain represents the most dominant transmission mechanism. The positive direction of IE3 is consistent with the non-support of H3 and warrants cautious interpretation. H5 Supported.

In addition to the primary hypothetical pathways, PROCESS produced two exploratory findings: path $a2$ ($X \rightarrow M2$) and path $b1$ ($M1 \rightarrow Y$). First, the direct path $X \rightarrow M2$ ($a2 = 0.175$; $p = 0.005$) indicates that digital lending characteristics also exert a direct effect on over-indebtedness risk prior to passing through business financial pressure. Second, the path $M1 \rightarrow Y$ ($b1 = 0.256$; $p = 0.007$) indicates that business financial pressure exerts a direct effect on business survival. Neither path constitutes a confirmatory hypothesis, and neither alters the primary conclusion regarding serial mediation in H5; their presence, however, enriches the picture of the transmission mechanism's complexity within the model.

DISCUSSION

Digital Lending Characteristics as a Source of Business Financial Pressure

The findings of this study indicate that digital lending characteristics, encompassing extreme ease of access, lack of cost transparency, aggressive collection practices, and automatic credit limit escalation, exert a significant positive effect on business financial pressure among MSMEs. The strength of this relationship, the largest among all pathways in the model, suggests that digital lending product design is not merely a technical feature; it constitutes a structural pressure that directly permeates the daily financial condition of small business operators.

When a platform offers disbursement within a matter of hours without meaningful creditworthiness assessment, MSMEs gain immediate capital, but at a cost that often far exceeds what they understood at the time of application. Daily interest charges, late payment penalties, and administrative fees that are not explicitly disclosed create what Schicks (2013) describes as the hidden cost of credit, costs that only become apparent when the first installment falls due and operating cash flow begins to erode. Aggressive collection practices

compound this situation by introducing a dimension of psychological pressure that disrupts the managerial focus of business operators, even before the financial condition formally deteriorates.

This finding is consistent with Suryono et al. (2021), who found that the absence of a rigorous credit selection process on Indonesian P2P lending platforms is the systemic root cause that directly affects the financial condition of borrowers. Warokka et al. (2025) similarly found, in a broader context, that exploitative characteristics of fintech lending products, rather than borrower behavior alone, contribute significantly to the financial instability of micro-enterprise operators. OJK data (2024) recording that more than twenty licensed P2P platforms carry non-performing loan ratios above the industry safety threshold further validate this finding at the aggregate level. Together, these bodies of evidence support the proposition that financial pressure among MSME users of digital lending is not solely a product of managerial weakness on the part of business operators, but also a consequence of product designs that are inherently risky for vulnerable borrowers.

Financial Pressure as a Driver of the Over-Indebtedness Spiral

This finding shifts the way the relationship between the two constructs is understood. Financial pressure has traditionally been treated primarily as a consequence of excessive debt: a borrower becomes trapped in debt and then experiences financial pressure. The data from this study, however, indicate that the relationship also operates in the reverse direction: financial pressure is a driver of debt accumulation, not merely its product.

The logic underlying this finding is rooted in what Myers and Majluf (1984) describe as the financing hierarchy in Pecking Order Theory. MSMEs under financial pressure, whether from falling seasonal revenues, urgent operational expenditures, or concurrent installment obligations, have limited alternatives. When formal banking channels are closed due to the absence of collateral or an established financial track record, digital lending becomes the only available route. But each time a new loan is taken out to cover an urgent need, future installment burdens increase, making the next episode of financial pressure more severe; this cycle repeats until the total burden exceeds a reasonable repayment capacity. This is what Schicks (2013) describes as the *debt trap*: a trap that is easy to enter but extremely difficult to exit.

Hamid (2025) found a similar pattern among Malaysian consumers, where persistent financial pressure drove borrow-close-reborrow behavior that serves as a primary indicator of over-indebtedness. Although the geographic context and type of borrower differ, the underlying mechanism is the same: when no alternative exists, individuals borrow again, and this worsens their condition. Altman (1968), in Financial Pressure Theory, asserts that unaddressed financial pressure is cumulative in nature; it does not stabilize at a single equilibrium point but continues to deteriorate until a crisis threshold is reached.

The Effect of Over-Indebtedness on Business Survival

The third hypothesis, which predicted that over-indebtedness risk would negatively affect MSME business survival, was not supported by the data. What the data in this sample reveal is, in fact, the opposite: MSMEs with higher levels of over-indebtedness risk tended

to report higher business survival scores. This finding is reported as observed, without adjustment to the interpretation.

The most methodologically plausible explanation is survivorship bias, a form of selection bias inherent in cross-sectional designs based on currently active respondents. This study reached MSMEs that were still in operation at the time of the survey. MSMEs most severely affected by over-indebtedness, those that had already shut down, declared insolvency, or ceased operations entirely, were not represented in the sample. Among the surviving group, a natural tendency exists: those who had borrowed the most were also those whose businesses had remained the most commercially active and financially capable. MSMEs that took on large volumes of digital lending were likely in an expansion phase rather than in a state of decline. The data capture this as a positive correlation between over-indebtedness and business survival, when in reality what has occurred is a sampling selection that fails to capture the adverse outcomes of the phenomenon.

A complementary explanation is the presence of business activity confounding: MSMEs that are more commercially dynamic and growth-oriented tend to take on more loans to finance expansion, thereby raising their M2 scores, while simultaneously demonstrating stronger business performance, thereby also raising their business survival scores. Both rise together not because over-indebtedness has a positive causal effect, but because both are simultaneously influenced by an unmeasured variable in the model, namely the growth orientation and managerial capacity of the business operator. Sudrajad (2026) documented an analogous phenomenon in the Indonesian context: MSMEs that actively use fintech lending exhibit better short-term performance, even as their long-term vulnerability increases. This finding serves as a reminder that survey-based studies must exercise considerable caution in interpreting correlations as causal relationships, particularly when samples are restricted to currently active respondents.

The Direct Effect of Digital Lending Characteristics on Business Survival

The direct effect of digital lending characteristics on MSME business survival was not statistically significant. Within the framework of this model, mediation produces a counterintuitive interpretation: the non-significance of the direct effect confirms that mediation is operating, and operating fully. When the mediators are introduced into the model, the initially large and highly significant total effect is reduced to a value indistinguishable from zero. This is the pattern that Hayes (2022) describes as full mediation: a condition in which the predictor affects the dependent variable entirely through the mediators, not directly. The implication is not that digital lending characteristics are inconsequential; their influence operates through a longer and more specific causal pathway, by first exacerbating business financial pressure and over-indebtedness risk. Without the intervening financial pressure and without excessive debt accumulation, the impact of digital lending characteristics on business survival becomes essentially undetectable.

This finding carries meaningful policy implications. If the effect of digital lending characteristics on business survival is fully mediated, then the most effective interventions are not those targeting the direct effect, such as restricting digital lending advertising, but those that sever the mediation pathway. Two critical intervention points emerge: first,

reducing the capacity of digital lending characteristics to generate business financial pressure; and second, strengthening MSME access to low-cost formal financing sources so that financial pressure does not automatically translate into a digital debt spiral. Policies addressing only one of these points without the other are unlikely to be sufficient.

Serial Mediation as the Dominant Transmission Mechanism

The data indicate that the two-stage causal chain in which digital lending characteristics first exacerbate business financial pressure, which then drives the accumulation of over-indebtedness risk, which in turn affects business survival, is the most dominant transmission mechanism compared to the single-mediator pathways also produced by the model. This is not merely a statistical confirmation; it confirms that the process by which digital lending erodes MSME business survival is gradual and cumulative, not immediate.

The dominance of the serial pathway over the single-mediator pathways carries deeper meaning. That the two-stage path is stronger than either single-stage path implies that financial pressure alone, without culminating in over-indebtedness, is insufficient to materially undermine business survival. Likewise, over-indebtedness that is not preceded by tangible financial pressure produces a weaker effect. What is most damaging is when both occur in sequence and mutually reinforce one another. Exploitative platform characteristics generate financial pressure; that pressure drives emergency borrowing that accumulates; and this accumulation is what ultimately erodes business capacity in a systematic fashion. Schicks (2013) describes this dynamic as the core of the microfinance debt trap: the harm does not originate from a single large loan, but from a series of small decisions, each of which appears rational in isolation but is collectively ruinous.

It should be noted that the positive direction found on this serial pathway, consistent with the non-support of H3, must be read in the context of the same sampling limitations described previously. In a population that includes MSMEs that have already ceased operations, this direction would in all likelihood reverse to align with theoretical predictions. Nevertheless, the statistical significance of the serial mediation remains valid; it confirms that the proposed causal chain exists within the data, and that the two-stage pathway is its primary route. Astuti and Kholidah (2024) found in the North Sulawesi context that MSME operators frequently fail to recognize the cumulative risk of repeated digital lending use, and it is precisely this awareness gap that allows the chain mechanism to operate without behavioral resistance from borrowers.

CONCLUSIONS

This study examined the serial mechanism through which digital lending characteristics affect MSME business survival via two sequential mediators: business financial pressure and over-indebtedness risk. Of the five hypotheses proposed, two were fully supported (H1 and H2), one was structurally supported (H5), and two were not supported (H3 and H4). The key finding indicates that exploitative digital lending characteristics significantly exacerbate business financial pressure, which in turn drives the accumulation of over-indebtedness risk; this two-stage chain constitutes the most dominant transmission mechanism in the model.

Theoretically, this study reinforces the relevance of *Debt Trap Theory* (Schicks, 2013) and *Pecking Order Theory* (Myers & Majluf, 1984) in the context of digital lending among Indonesian MSMEs, while providing the first empirical evidence of the dominance of the serial mediation pathway over single-mediator pathways in this setting. From a policy standpoint, the findings indicate that effective regulation cannot be limited to targeting platform product design alone, as mandated by OJK Regulation No. 40/2024, but must be accompanied by programs that strengthen MSME access to formal financing, so that the spiral from financial pressure toward over-indebtedness can be interrupted before it threatens business survival.

Research Limitation

This study employed a cross-sectional design with a sample consisting of currently active MSME operators, rendering it susceptible to survivorship bias. MSMEs that had ceased operations as a result of over-indebtedness are not represented in the sample, which likely accounts for the positive direction of the M2 to Y effect identified in this study. Future research is recommended to adopt a longitudinal design or expand sampling to include inactive MSMEs in order to obtain a more comprehensive picture of the phenomenon.

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