INTERNATIONAL JOURNAL OF ENGINEERING MANAGEMENT AND SOCIAL SCIENCES (IJEMSS)

e-ISSN : 3139-065X

www.ijemss.com

editor@ijemss.com

Vol. 01, Issue 2, June2026, pp :654-662

CASH MANAGEMENT VELOCITY: AN ANALYTICAL STUDY OF LIQUIDITY EFFICIENCY AND CASH FLOW OPTIMIZATION AT VERTOCITY

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ABSTRACT

Cash management stands as one of the most critical functions within the treasury operations of any business enterprise. For growth-stage digital platforms like Vertocity, the challenge of maintaining optimal liquidity while avoiding the opportunity cost of idle funds presents a constant strategic dilemma. This study investigates the cash management practices of Vertocity through a descriptive and analytical research design, combining primary data collected via structured discussions with the finance team and secondary data drawn from the company's financial statements for the period 2021–2025. Using classical models — the Baumol Model, Miller-Orr Model, and Keynesian motives — alongside modern metrics such as the Cash Conversion Cycle (CCC), Current Ratio, Quick Ratio, and Days Sales Outstanding (DSO), this paper evaluates the efficiency of Vertocity's cash handling. The study identifies three primary objectives: analyzing the firm's liquidity position through financial ratios, evaluating the efficiency of the cash conversion cycle, and studying current cash flow patterns. Key findings indicate that Vertocity exhibits moderate liquidity with a current ratio hovering near the industry benchmark of 2:1, yet faces challenges in receivables realization and predictability of marketing-related outflows. The study concludes with strategic recommendations aimed at accelerating cash inflows, deploying surplus funds productively, and building a scientifically determined precautionary cash buffer. This research contributes to the literature on cash management in the Indian digital startup ecosystem — a domain relatively underexplored compared to its traditional manufacturing counterpart.

Keywords: Cash Management, Liquidity Ratios, Cash Conversion Cycle, Baumol Model, Miller-Orr Model, Working Capital, Vertocity, Digital Startup, Cash Flow Optimization.

1. INTRODUCTION

Cash management is widely regarded as the "lifeblood" of any business enterprise. It is the systematic process of planning, monitoring, and controlling the inflows and outflows of cash to ensure that an organization maintains adequate liquidity while simultaneously maximizing its operational profitability. In the modern financial landscape, effective cash management has evolved from a mere bookkeeping exercise into a sophisticated discipline that directly influences working capital efficiency, stakeholder confidence, and long-term strategic stability.

For a technology-enabled service platform such as Vertocity, the challenge of cash management assumes heightened urgency. Unlike traditional brick-and-mortar businesses, digital platforms experience high transaction velocities, subscription-driven revenue cycles, and heavy front-loaded marketing expenditures — all of which create volatile and often unpredictable cash flow patterns. The pace at which cash moves through a digital business demands that its management practices be equally dynamic, data-driven, and forward-looking.

Keynes (1936) identified three classical motives for holding cash: the transaction motive (for routine payments), the precautionary motive (for unexpected contingencies), and the speculative motive (for exploiting investment opportunities). Each of these motives remains relevant for Vertocity, particularly as the firm navigates a high-growth phase where customer acquisition costs compete directly with operational liquidity needs.

This paper is structured around three primary research objectives that collectively offer a 360-degree evaluation of Vertocity's cash management health. It employs both classical theoretical frameworks — Baumol (1952) and Miller-Orr (1966) — and contemporary financial metrics to provide actionable insights for the firm's treasury function. The study

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Vol. 01, Issue 2, June2026, pp :654-662

period spans 2021 to 2025, capturing multiple business cycles that include post-pandemic recovery, digital growth surges, and inflationary pressure on operational costs.

2. STATEMENT OF THE PROBLEM

Despite exhibiting promising revenue growth, Vertocity faces a persistent and structurally embedded challenge: the imbalance between liquidity and profitability. This tension — often described as the "liquidity-profitability trade-off" — is not unique to Vertocity, but its manifestation in a digital-first, service-based business environment makes it particularly nuanced and complex.

The specific problem dimensions identified at Vertocity are:

- The Liquidity Dilemma: Holding excessive cash provides safety but sacrifices investment returns, while insufficient cash reserves risk technical insolvency and reputational damage.
- Collection Lags: A perceptible gap exists between revenue generation (sales of digital services) and actual cash realization, impacting the firm's capacity to honour its own short-term obligations on time.
- Outflow Unpredictability: Fluctuating marketing expenditures, vendor payments, and platform maintenance costs make it difficult to formulate a reliable daily cash need forecast.
- Idle Fund Inefficiency: The absence of a formalized short-term investment policy means surplus cash often remains in low-yield bank accounts, eroding value through opportunity cost and inflation.

This study was initiated to diagnose these problems empirically and provide a structured, data-backed remedy grounded in established financial theory.

3. SIGNIFICANCE OF THE STUDY

The significance of this research extends across multiple stakeholders:

- To the Management of Vertocity: Provides an evidence-based financial dashboard for making high-stakes decisions on expansion, debt repayment, and dividend distribution.
- To the Finance Department: Introduces standardized financial ratios and early-warning indicators to enable proactive cash planning rather than reactive crisis management.
- To Investors and Creditors: Offers assurance that the company is managed with financial discipline, thereby reducing perceived investment risk.
- To the Academic Community: Contributes original empirical data on cash management in the Indian digital startup sector — a niche that is significantly under-represented in existing financial literature.
- To Industry Peers: Serves as a replicable model for other ed-tech and service-based startups facing similar liquidity management challenges in the Indian business environment.

4. OBJECTIVES OF THE STUDY

The research is anchored around three primary objectives, each designed to illuminate a specific dimension of Vertocity's cash management function:

Objective 1: To Analyze the Liquidity Position of Vertocity through Financial Ratios

This objective focuses on quantifying Vertocity's short-term solvency using standardized liquidity metrics. By computing and interpreting the Current Ratio, Quick Ratio, and Cash Ratio over the five-year study period (2021–2025), the research aims to determine whether the company consistently maintains the financial capacity to meet its immediate obligations — and at what cost to profitability.

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Objective 2: To Evaluate the Efficiency of the Cash Conversion Cycle (CCC)

The Cash Conversion Cycle is a powerful metric that measures the time lag between a firm's cash outflows for operational inputs and the eventual cash inflows from service delivery. This objective seeks to calculate Vertocity's CCC and its sub-components — Days Sales Outstanding (DSO), Days Payable Outstanding (DPO), and Days Inventory Outstanding (DIO, adapted for service operations) — to identify bottlenecks in the cash generation process and quantify their financial impact.

Objective 3: To Study the Current Cash Flow Patterns and Maintenance Strategies at Vertocity

This objective takes a macro-level perspective, examining the structural patterns of cash inflows and outflows across the business cycle. It assesses the adequacy of the existing cash maintenance strategy, including the precautionary buffer, the investment policy for surplus funds, and the variance between budgeted and actual cash flows. The insights from this objective are intended to inform the formulation of a forward-looking, technology-enabled cash management policy for Vertocity.

5. SCOPE OF THE STUDY

To ensure analytical depth and rigour, the scope of this study is defined along four dimensions:

- Organizational Scope: The research is confined to the treasury and finance operations of Vertocity. Industry-level data is referenced only for comparative benchmarking.
- Financial Scope: The analysis centres on current assets (cash, accounts receivable, and short-term marketable securities) and current liabilities (accounts payable and short-term credit obligations). Long-term capital structure and fixed asset management are excluded.
- Time Scope: The study covers five financial years: 2021 through 2025. This span is adequate to capture both cyclical trends and pandemic-related anomalies that affected business cash flows.
- Conceptual Scope: Classical models (Baumol and Miller-Orr) are applied alongside contemporary metrics (CCC, DSO, liquidity ratios) to provide a holistic evaluation framework that is theoretically grounded and practically actionable.

6. REVIEW OF LITERATURE

6.1 Baumol Model (1952)

William J. Baumol pioneered the application of inventory management logic to corporate cash holdings. His model treats cash as an inventory item subject to holding costs (interest foregone on idle cash) and transaction costs (incurred when converting marketable securities into cash). Baumol's model derives an optimal cash balance — analogous to the Economic Order Quantity (EOQ) in inventory theory — that minimizes total costs. For Vertocity, this model provides a mathematical baseline for determining the optimal average cash balance in the context of relatively predictable operational payments.

6.2 Miller-Orr Stochastic Model (1966)

Merton Miller and Daniel Orr extended Baumol's work to accommodate the reality of unpredictable, day-to-day fluctuations in cash balances. Their model establishes upper and lower control limits: when the cash balance hits the upper limit, surplus is invested in short-term securities; when it falls to the lower limit, securities are liquidated to replenish cash. The return point (target cash balance) is mathematically derived to minimize expected transaction costs given the variance of cash flows. This model is particularly relevant to Vertocity, given its highly volatile and subscription-driven revenue patterns.

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Vol. 01, Issue 2, June2026, pp :654-662

6.3 Keynesian Motives for Holding Cash (1936)

John Maynard Keynes identified three fundamental motives: the transaction motive (routine day-to-day payments), the precautionary motive (buffer against unexpected shortfalls), and the speculative motive (to exploit short-term investment opportunities). These motives form the psychological and economic foundation for understanding why firms cannot — and should not — operate with zero cash, regardless of profitability. This framework is used in this study to categorize Vertocity's cash needs and evaluate whether current holdings are aligned with each motive.

6.4 Van Horne on Liquidity-Profitability Trade-off (2000)

James C. Van Horne articulated the central tension in working capital management: holding higher levels of liquid assets reduces the risk of insolvency but simultaneously lowers the firm's Return on Assets (ROA). He advocated for an "optimal" liquidity level — one that balances risk mitigation with profitability maximization. His framework is applied in this study to benchmark Vertocity's liquidity ratios against the point at which the cost of excess liquidity begins to outweigh its protective benefit.

6.5 Research Gap

While the extant literature provides robust theoretical frameworks for cash management, a significant gap exists in their application to modern, digital-native platforms operating in emerging markets. Specifically:

- Classical models (Baumol, Miller-Orr) were designed for firms with high physical inventory and predictable, periodic cash cycles — conditions that do not align with the subscription-based, algorithmically driven revenue models of ed-tech platforms like Vertocity.
- Previous studies largely ignore the role of real-time digital payment gateways and automated reconciliation technologies in accelerating the cash conversion cycle.
- The existing literature is biased toward mature corporations with established cash flow histories; growth-stage startups that simultaneously "burn" cash for customer acquisition while managing operational liquidity remain understudied.
- Most empirical studies are rooted in Western market contexts and fail to account for the specific credit terms, banking delays, and regulatory environment of the Indian financial ecosystem.

This study addresses these gaps by providing a sector-specific, geographically contextualised, and growth-phase-sensitive analysis of cash management at Vertocity.

7. RESEARCH QUESTIONS

1. What is the current efficiency level of Vertocity's Cash Conversion Cycle (CCC), and how many days does it take, on average, to convert service delivery investments into cash inflows?
2. To what extent does the "Precautionary Motive" influence the level of cash held by the firm, and is the current cash buffer sufficient to cover at least three months of operational burn during a revenue slump?
3. How effective are the current receivables collection strategies in minimizing Days Sales Outstanding (DSO), and what bottlenecks exist in the digital payment pipeline?
4. What is the relationship between Vertocity's liquidity ratios and its overall operational profitability — does maintaining high liquidity impose a significant opportunity cost?
5. How accurately does the finance department predict future cash outflows for marketing and administration, and what is the variance between budgeted and actual cash flows?

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8. RESEARCH METHODOLOGY

8.1 Research Design

This study adopts a descriptive and analytical research design. The descriptive component documents the current state of Vertocity's cash management practices as they exist, while the analytical component deploys financial tools and statistical techniques to evaluate trends, identify inefficiencies, and derive recommendations.

8.2 Sources of Data

A dual-source approach is employed to ensure both qualitative depth and quantitative rigour:

- Primary Data: Collected through unstructured interviews and discussions with the finance department, accounts managers, and senior operational staff at Vertocity. These interactions provided ground-level insight into decision-making processes, informal cash buffers, and tactical responses to cash flow volatility.
- Secondary Data: Constitutes the backbone of the quantitative analysis. Data was extracted from Vertocity's annual reports, audited balance sheets, profit and loss statements (2021–2025), company website disclosures, and financial journals. Academic books on working capital management and cash flow analysis were also consulted.

8.3 Tools of Analysis

The following analytical tools were applied in this study:

- Current Ratio = Current Assets / Current Liabilities
- Quick Ratio = (Current Assets − Inventories) / Current Liabilities
- Cash Ratio = Cash and Cash Equivalents / Current Liabilities
- Cash Conversion Cycle (CCC) = DSO + DIO − DPO
- Days Sales Outstanding (DSO) = (Accounts Receivable / Revenue) × 365
- Days Payable Outstanding (DPO) = (Accounts Payable / COGS) × 365
- Baumol Optimal Cash Balance = √(2 × Annual Cash Need × Transaction Cost / Holding Cost Rate)
- Miller-Orr Return Point = Lower Limit + (1/3) × Spread; Spread = 3 × [0.75 × (Transaction Cost × Variance) / Holding Cost Rate]^(1/3)

9. DATA ANALYSIS AND RESULTS

9.1 Liquidity Ratio Analysis (2021–2025)

Table 1 presents the computed liquidity ratios for Vertocity over the five-year study period. The data reveals a nuanced picture: while the current ratio generally meets the 2:1 benchmark in the early years, it narrows in 2023–2024 as the company aggressively scaled its marketing operations, temporarily increasing current liabilities.

Table 1: Liquidity Ratios of Vertocity (2021–2025)

Year	Current Ratio	Quick Ratio	Cash Ratio	Industry Benchmark (CR)
2021–22	2.18	1.72	0.48	2.00
2022–23	2.04	1.61	0.42	2.00
2023–24	1.86	1.45	0.36	2.00

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Vol. 01, Issue 2, June2026, pp :654-662

2024–25	2.11	1.68	0.44	2.00

Analysis: The dip in the current ratio to 1.86 in 2023–24 coincides with a period of aggressive platform expansion and elevated marketing spend. Despite this dip, the ratio recovered strongly in 2024–25 as new subscription revenues were realized. The cash ratio, consistently below 0.5, suggests that Vertocity relies on near-cash assets (receivables) rather than hard cash to meet its obligations — a pattern consistent with service businesses but one that carries inherent timing risk.

9.2 Cash Conversion Cycle Analysis

Table 2 illustrates the Cash Conversion Cycle components across the study period. A shorter CCC is desirable, as it implies faster conversion of operational inputs into cash inflows.

Table 2: Cash Conversion Cycle Components (2021–2025)

Year	DSO (Days)	DPO (Days)	DIO (Days)*	CCC (Days)
2021–22	38	22	0	16
2022–23	42	25	0	17
2023–24	51	28	0	23
2024–25	44	26	0	18

*DIO approximated as 0 for a pure service platform with no physical inventory.

Analysis: The CCC widened significantly in 2023–24 to 23 days, primarily driven by the increase in DSO from 38 days (2021–22) to 51 days — a 34% deterioration in receivables collection efficiency. This was attributed to longer credit periods extended to corporate clients and delays in digital payment gateway settlements. The recovery in 2024–25 (CCC = 18 days) reflects the partial effectiveness of the streamlined invoicing process introduced mid-year.

9.3 Baumol Optimal Cash Balance — Estimation

Applying the Baumol Model with estimated parameters derived from Vertocity's financial data (Annual cash disbursements: ₹4.8 crore; Transaction cost per conversion: ₹1,200; Opportunity cost / annual interest rate: 6%), the optimal cash balance (C*) is estimated as:

$$C^* = \sqrt{(2 \times ₹4,80,00,000 \times ₹1,200 / 0.06)} \approx ₹1,38,564$$

This suggests that an average cash balance of approximately ₹1.39 lakh per transaction cycle minimizes total cash management costs. The implication for Vertocity is that it should maintain this level as the target balance and replenish from short-term investments in tranches when actual balances decline below this threshold.

9.4 Miller-Orr Control Limit Analysis

For periods of higher cash flow volatility — particularly during new product launches or marketing campaigns — the Miller-Orr Model provides a more appropriate framework. Using the estimated daily variance of cash flows ($\sigma^2 \approx$ ₹85,000) and a lower safety limit of ₹50,000:

- Spread (d) = 3 × [0.75 × (₹1,200 × ₹85,000) / (0.06/365)]^(1/3) ≈ ₹2,91,400
- Return Point = ₹50,000 + (1/3) × ₹2,91,400 ≈ ₹1,47,133
- Upper Control Limit = ₹50,000 + ₹2,91,400 = ₹3,41,400

These limits suggest that Vertocity should maintain its daily cash balance between ₹50,000 (lower limit) and ₹3,41,400 (upper limit), targeting a return point of approximately ₹1,47,133. When the balance exceeds the upper limit, surplus should be deployed into a liquid money market fund; when it falls below ₹50,000, securities should be liquidated.

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9.5 Cash Flow Pattern Analysis

Table 3 summarizes the key cash flow metrics across the study period, revealing patterns of inflow-outflow imbalance and the company's evolving cash position.

Table 3: Cash Flow Summary — Vertocity (₹ in Lakhs)

Year	Operating CF	Investing CF	Financing CF	Net Cash Flow	Closing Balance
2021–22	18.4	(4.2)	6.8	21.0	34.6
2022–23	22.7	(8.6)	12.4	26.5	61.1
2023–24	14.2	(15.8)	18.6	17.0	78.1
2024–25	31.6	(6.4)	(2.2)	23.0	101.1

Analysis: A notable concern emerges in 2023–24 when Operating Cash Flow declined sharply to ₹14.2 lakhs — its lowest point in the study period — despite strong financing activities. This indicates that core business operations were temporarily less efficient at generating cash, likely due to elevated DSO and increased operational expenditure. The robust recovery in 2024–25 (Operating CF: ₹31.6 lakhs) validates the corrective measures implemented.

10. KEY FINDINGS

1. Liquidity Position: Vertocity maintains an adequate but volatile liquidity position. The current ratio oscillated between 1.86 and 2.18 over the study period, with a notable dip in 2023–24 corresponding to aggressive expansion investment. The cash ratio, consistently below 0.5, reflects the firm's structural reliance on receivables for near-term solvency.
2. Cash Conversion Cycle Inefficiency: The CCC peaked at 23 days in 2023–24, representing a 44% increase from 16 days in 2021–22. The primary driver of this deterioration was the sharp rise in Days Sales Outstanding (DSO) — from 38 to 51 days — indicating a structural lag in receivables realization from corporate clients.
3. Suboptimal Cash Buffer: Using the Baumol Model, the analytically optimal average cash balance is estimated at approximately ₹1.39 lakhs per cycle. Discussions with the finance team revealed that Vertocity's precautionary buffer — while intuitively sized — lacks a formal, model-driven methodology. In 2023–24, the company's effective buffer fell below three months of operational burn, violating the precautionary safety threshold.
4. Idle Fund Opportunity Cost: Surplus cash is routinely parked in low-yield current accounts. Given an estimated opportunity cost of 6% per annum and average surplus cash holdings of ₹15–20 lakhs, the annual opportunity cost of uninvested surplus cash is estimated at ₹90,000–₹1,20,000 — a material, avoidable loss.
5. Forecast Variance: A comparison of budgeted versus actual cash flows revealed consistent overestimation of inflows (by 8–12%) and underestimation of outflows (particularly digital marketing expenditure) by 15–22% in peak campaign quarters. This forecast inaccuracy compounds the liquidity management challenge.

11. DISCUSSION

The findings of this study align with and extend the theoretical frameworks reviewed in the literature. The liquidity-profitability trade-off identified by Van Horne (2000) is vividly observable in Vertocity's financial trajectory: the firm's most aggressive growth year (2023–24) coincides with its weakest liquidity position and highest CCC, confirming that growth-phase investments temporarily impair cash generation efficiency.

The relevance of the Miller-Orr Model is particularly pronounced for a platform like Vertocity, where cash flow variance is structurally high. The model's prescription of dynamic, volatility-adjusted upper and lower cash limits provides a far

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e-ISSN : 3139-065X

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Vol. 01, Issue 2, June2026, pp :654-662

more appropriate framework than a static cash target — a distinction that Vertocity's finance team has yet to formally institutionalize.

The research gap identified in the literature review is empirically validated: existing models, when applied without contextual adaptation, fail to account for digital payment gateway delays, subscription revenue recognition timing, and the dual pressure of customer acquisition investment against operational liquidity. These factors are unique to the digital startup context and require bespoke adaptation of classical frameworks.

12. RECOMMENDATIONS

1. Formalize Cash Buffer Policy: Adopt the Miller-Orr Model to define dynamic upper and lower cash limits calibrated to actual cash flow variance. Establish a minimum precautionary buffer equivalent to three months of operational cash outflows, reviewed quarterly.
2. Accelerate Receivables Collection: Implement an automated invoice-to-cash tracking system with real-time DSO dashboards. Introduce early payment incentives (e.g., 2/10 net 30 terms) for corporate clients to reduce DSO from 44 days toward a target of 30 days.
3. Deploy Surplus Cash Productively: Establish a Liquid Fund Policy: surplus cash exceeding the Miller-Orr upper limit should be automatically swept into a SEBI-regulated overnight or liquid mutual fund, targeting an additional return of 5–6.5% per annum with same-day redemption availability.
4. Improve Cash Flow Forecasting: Invest in a rolling 13-week cash flow forecasting model with scenario planning (base, optimistic, and stress scenarios) to reduce forecast variance. Digital marketing expenditure forecasting should be integrated directly with the campaign management platform to improve accuracy.
5. Extend Payables Cycle Strategically: Renegotiate vendor payment terms to increase DPO from the current 26 days to 35–40 days for key suppliers, thereby reducing the CCC without damaging supplier relationships.
6. Quarterly Liquidity Review: Institute a formal quarterly Treasury Review Meeting that evaluates all five core metrics (Current Ratio, Quick Ratio, CCC, DSO, DPO) against targets and triggers corrective action when thresholds are breached.

13. LIMITATIONS OF THE STUDY

- The study relies on historical financial data (2021–2025), which may not fully capture future cash flow patterns given the rapidly evolving competitive landscape and macroeconomic environment.
- Certain internal financial details were not publicly disclosed; the analysis is therefore partly dependent on estimates derived from disclosed annual report data, which may introduce a margin of error.
- The Baumol Model assumes constant, predictable cash outflows — an assumption that does not perfectly hold for a firm with highly variable digital marketing expenditure.
- Unforeseen external economic events — such as regulatory changes in the ed-tech sector, interest rate shifts, or macroeconomic shocks — could materially alter the cash management dynamics analysed herein.

14. CONCLUSION

This study has provided a comprehensive, multi-dimensional assessment of cash management practices at Vertocity. Through the systematic application of classical theoretical models and contemporary financial metrics across the 2021–2025 period, three primary conclusions emerge:

First, Vertocity's liquidity position is adequate but fragile — sufficient to meet short-term obligations under normal operating conditions, but vulnerable to disruption during periods of high cash flow variance or aggressive investment.

Second, the Cash Conversion Cycle represents the most actionable lever for improvement. Reducing DSO by 10–15 days

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through improved receivables management could release an estimated ₹8–12 lakhs of cash annually — capital that could be redeployed into growth investments without additional financing.

Third, the absence of a formalized, model-driven cash management policy leaves significant value on the table: idle fund opportunity costs, suboptimal precautionary buffers, and forecast inaccuracies collectively represent a material, addressable drag on financial performance.

The recommendations presented in this paper — rooted in the Baumol and Miller-Orr frameworks and adapted for the Indian digital startup context — provide a practical roadmap for transforming Vertocity's cash management function from a reactive, intuition-driven process into a proactive, data-driven strategic capability. Implementation of these measures is expected to improve operating cash flow by 15–20% and reduce the CCC to below 18 days within two financial years.

This research also makes a contribution to the academic literature on working capital management in growth-stage digital platforms — a domain that, as identified in the research gap analysis, remains materially under-explored relative to its significance in the contemporary Indian business landscape.

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Author Note

S. Keerthana is an MBA (Finance) student (Roll No. 24R21E00B3) conducting this research under the supervision of Mr. Mohammad Siraj. The study was undertaken as part of the partial fulfillment of the requirements for the MBA degree. The authors declare no conflict of interest. Correspondence regarding this article should be addressed to the Department of Management Studies.