Trends in Digital Supply Chain Finance for MSME in India: Evidence from India's TReDS Platforms

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Abstract: *This research analyzes recent trends and growth dynamics in digital supply chain finance for micro, small, and medium enterprises (MSMEs) in India and is based on evidence from the Trade Receivables Discounting System (TReDS) ecosystem. The analysis uses secondary data, which is derived from official disclosures of the TReDS platform, and covers the period 2022-2025. Descriptive statistics, compound growth rate estimation, linear regression-based trend analysis, and correlation analysis are used to assess the changes in transaction volume and value. The indings reveal strong and steady growth in digital supply chain finance activity. Both the number and value of factoring transactions showed steady growth over the study period, with the value of transactions growing at a greater rate than the number of transactions, thus implying an increase in the average size of financing. Regression-based trend estimates indicate the presence of positive and statistically significant temporal effects, which supports the conclusion that the observed growth is not ephemeral. Correlation analysis further supports the existence of a highly positive relationship between the volume and value of transactions, with a complementary development of both scale and financial depth. This research provides systematic indings reveal strong and steady growth in digital supply chain finance activity. Both the number and value of factoring transactions showed steady growth over the study period, with the value of transactions growing at a greater rate than the number of transactions, thus implying an increase in the average size of financing. Regression-based trend estimates indicate the presence of positive and statistically significant temporal effects, which supports the conclusion that the observed growth is not ephemeral. Correlation analysis further supports the existence of a highly positive relationship between the volume and value of transactions, with a complementary development of both scale and financial depth. This research provides systematic fempirical evidence on the recent evolution of digital supply chain finance in India and adds to the nascent literature on digital finance and MSME development. These results provide policy-relevant information with the goal of shoring up platform-based financing instruments in emerging economies.*

Keywords: Digital supply chain finance, MSMEs, TReDS, Factoring, Digital Finance, India.

INTRODUCTION

Micro Small and Medium Enterprises (MSMEs) role in country's economy is significant with its contribution to the national GDP which is 30% approximately and employment is over 111 million(*Publications - Reserve Bank of India*, n.d.)(*ECR 2021-22*, n.d.). The sector plays a very important role in escalating output, advancing innovation, and promoting inclusive growth through widespread employment generation and rural industrialisation. By offering the range of products and services to address the demand of domestic and international markets, the sector has gained significant importance to nations (Bhrigujyoti Rabha & Dipankar Malakar, 2025)

MSMEs, or Micro, Small, and Medium-Sized Enterprises (MSMEs), have long emphasised the need for easy access to capital, lower interest rates, quick realisation of sales, and predictable cash flow(*Iifb.Org.In*, n.d.). Even though they are the main contributors to the Indian Economy, they struggle with obtaining funding due to a lack of assets for collateral and high service costs, which leads to a credit gap and hinders its growth. Only 10% of MSMEs in India can access formal funding, pushing them to rely on Supply Chain Financing (SCF) and innovative solutions to bridge this gap(*Iifb.Org.In*, n.d.).

The Reserve Bank of India (RBI) has found a solution to these challenges using the Trade Receivables Discounting System (TReDS) (*Iifb.Org.In*, n.d.). Indian MSMEs are discounting their sales invoices at a large scale using the TReDS platforms.(*Iifb.Org.In*, n.d.)

The Trade Receivables Electronic Discounting System (TReDS) is an online platform that has been introduced in the Indian Financial System as a mechanism to enable micro, small, and medium enterprises (MSMEs) in India to access working capital by discounting their trade receivables (*Iifb.Org.In*, n.d.). The objective of establishing TReDS has facilitated the price discovery auction-based mechanism for trade receivables of MSME sellers through an efficient and cost-effective factoring and reverse factoring process drawn against buyers (large corporates, PSUs, Government departments) financed through multiple financiers (banks, NBFC-Factors, and other financial institutions, as permitted) at competitive rates (*Iifb.Org.In*, n.d.). It is a platform for uploading, accepting, discounting, trading, and settling invoices/bills of MSMEs and facilitating both receivables and payables factoring (reverse factoring). All transactions processed under this system are "'without recourse" to MSMEs.(*Payment Systems in India - Booklet*, n.d.) (*Iifb.Org.In*, n.d.)

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LITERATURE REVIEW

Supply Chain Finance (SCF) is widely conceptualized as a mechanism that aligns financial flows with physical and information flows to improve working capital efficiency and liquidity across supply chains(*Publications - Reserve Bank of India*, n.d.) (Gelsomino et al., 2016) The literature highlights that traditional supply chain research has largely underemphasized financial flows, despite their critical role in supply chain performance (Gelsomino et al., 2016). More recent studies extend the conceptualisation of SCF beyond working capital optimisation, emphasising its strategic importance in strengthening inter-firm relationships, reducing information asymmetry, and enhancing supply chain resilience, particularly through digitally enabled platforms (*Dr Asifulla*, n.d.).

In emerging economies such as India, the relevance of digital SCF is heightened by persistent financing constraints faced by Micro, Small, and Medium Enterprises (MSMEs), arising mainly from delayed payments and limited access to formal credit (Banerjee & Duflo, 2014). A digital platform launched by the Reserve Bank of India in 2014, called TReDS, enables businesses to discount trade receivables using an online marketplace where pricing emerges via bidding(*Publications - Reserve Bank of India*, n.d.). While it operates without recourse risk, funding flows through electronic confirmation paired with a competitive rate setting. Evidence shows that small firms often see better cash flow timing and improved collection cycles. However, gains in actual profit margins remain modest according to recent assessments. Although advantages exist, usage varies widely depending on location and industry type. Not every sector taps this system equally. The hidden room for growth persists beneath surface-level participation rates.

However, existing studies on SCF and TReDS in India mostly rely on theoretical models, reviews, or company surveys, rarely tapping into long-term public datasets. Little attention has been paid to actual platform activities, such as how transaction numbers, amounts, expansion patterns, and funding effectiveness shift across years. To fill this void, this study traces trends using TReDS figures, tracking how digital supply chain financing for Indian MSMEs has changed in size and function. This research paper adds to the knowledge of digital supply chain finance through its objectives and results, using secondary data from RBI reports on platforms registered on TReDS.

Objectives:

1. To describe the growth of Digital Supply Chain Finance for MSMEs in India.
2. To estimate pace of growth in MSME digital financing
3. To compare the performance of TReDS platforms in scaling MSME financing
4. To identify long-term trends in the digital supply chain
5. To assess the relationship between transaction volume and transaction value in MSME digital supply chain finance.

Research Hypotheses

H1: Digital supply chain finance for MSMEs in India exhibits a significant upward trend in both the number and value of factoring units on TReDS platforms.

H2: The CAGR of transaction value on TReDS platforms is higher than that of transaction volume, indicating an increasing scale of MSME financing.

H3: There are significant differences in the growth and scale of factoring activities across TReDS platforms.

H4: Growth in the number of financed factoring units is positively associated with growth in transaction value.

H5: The conversion efficiency of TReDS platforms, measured as the ratio of units financed to units uploaded, improves over time.

METHODOLOGY:

The study uses a quantitative, descriptive, and analytical research design to analyse trends in digital supply chain finance for MSMEs in India using the Trade Receivables Discounting System (TReDS). Based on official disclosures of TReDS platforms and covering the period from 2022 through 2025, secondary data were collected from the Reserve Bank of India. The analysis uses a trend and comparative framework to assess what happens at any point in time, the distribution patterns of such activity, and platform-level differences in MSME financing activities. Through a comprehensive analysis of platform-level and aggregate indicators, such as uploading and funding factoring units, this study seeks to draw conclusions that are theoretically valuable. Slimily, it casts a critical eye on all possible reasons for the paths behind this phenomenon, investigates the relevance of various viewpoints, and suggests more complete explanations.

Descriptive statistical methods were used to summarise temporal patterns on an annual basis. This is followed by the estimation of the compound annual growth rate (CAGR) to establish the pacing of growth in both the transaction volume and value of the transactions. A linear regression framework was then conducted at the aggregate and platform-specific levels, with year as the explanatory variable, to identify long-term growth trajectories. Platform-level comparisons are performed to examine heterogeneity in terms of scale, growth, and conversion efficiency, the latter being measured as a ratio of financed to uploaded factoring units. Moreover, transaction volume versus transaction value was analysed using correlation and joint trend analyses. All statistical examinations and corresponding visualisations were performed using the R statistical environment and Excel, thus ensuring methodological consistency, transparency, and replicability.

Trade Receivables Discounting System (TReDS)

Trade Receivables Discounting System (TReDS) is a digital platform established under the Payment and Settlement Systems Act, 2007, to facilitate the financing of trade receivables for MSMEs by various financiers(*Payment Systems in India - Booklet*, n.d.)(Bhrigujyoti Rabha & Dipankar Malakar, 2025). It involves three key participants: sellers (MSMEs), buyers (corporates, PSUs, and government entities), and financiers (banks and NBFCs approved by RBI)(*Payment Systems in India - Booklet*, n.d.). MSMEs registered under the Udyam portal can upload invoices from buyers, which are then bid on by financiers based on the buyer's credit profile(Bhrigujyoti Rabha & Dipankar Malakar, 2025). The financier offering the lowest discount rate pays the MSME, whereas the buyer later repays the financier. Importantly, TReDS is a non-recourse platform, meaning MSMEs bear no liability if buyers default(Bhrigujyoti Rabha and Dipankar Malakar, 2025).

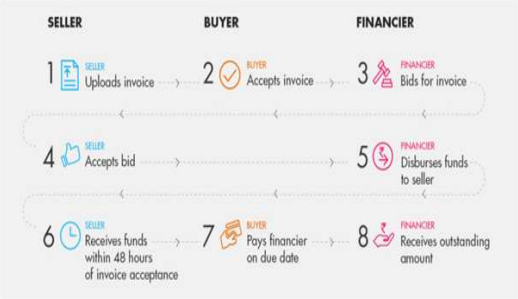
There are five platforms operating on TReDS in India:

Trade Receivables Discounting System (TReDS)

Trade Receivables Discounting System (TReDS)				
1	A.TREDS Limited	11th Floor, A3, Ashar IT Park, Road No 16Z, Wagle Industrial Estate, Thane(W)- 400 604	TReDS system known as "INVOICEMART"	29.06.2017
2	C2FO Factoring Solutions Private Limited	C2FO Factoring Solutions Private Limited, D-26, Basement, Jangpura Extension, New Delhi-110014	TReDS system known as 'C2treds'	04.03.2024
3	KredX Platform Private Limited	KredX Platform Private Limited, Wing A, Tower A, Salarpuria Softzone, Salarpuria Outer Ring Road, Bellandur, Bengaluru, Karnataka- 560103	TReDS system known as 'DTX'	01.01.2025
4	Mynd Solutions Private Limited	Mynd Solutions Private Limited –F-83, East of Kailash, New Delhi – 110 065	TReDS system known as M1xchange	20.03.2017
5	Receivables Exchange of India Limited (RXIL)	Receivables Exchange of India Limited (RXIL), 701-702, 7th Floor, Supremus – E Wing, I-Think Techno Campus, Kanjurmarg East, Mumbai - 400042	TReDS system known as RXIL	17.05.2017 *Note: The entity was granted approval to commence operations w.e.f 01.12.2016*

Source:(Publications - Reserve Bank of India, n.d.)(Payment Systems in India - Booklet, n.d.)

TReDS Process Flow:



Source: (TReDing a New Path to MSME Finances, n.d.)

Data Description:

The study uses secondary data from the official disclosure of the Reserve Bank of India (RBI) and TReDS platform reports. The dataset covers the period–2022-2025 and includes platform-wise information on the number of factoring units uploaded and financed and the value of factoring units uploaded and financed. These variables jointly capture the scale, growth, and efficiency of digital supply chain finance for MSMEs in India. These variables jointly capture the scale, growth, and efficiency of digital supply chain finance for MSMEs in India. The detailed platform-wise distribution of the uploaded and financed factoring units and their values are presented in Table 1.

Table 1: Units and Value of Factoring Units uploaded and Financed on various platforms

Platforms	Year	Units uploaded	Value uploaded (in Rs000)	Units Financed	Value financed (in Rs000)
TReDS	2022	1,06,657.00	21,36,91,939.17	96,045.00	19,76,97,814.36
	2023	2,08,364.00	42,62,14,515.64	1,92,086.00	40,09,82,697.79
	2024	3,32,885.00	72,95,29,341.84	3,07,246.00	68,31,02,038.08
	2025	3,96,339.00	89,67,50,793.58	3,69,237.00	84,45,47,381.36
MYND	2022	77,827	16,85,41,361	70,587	15,38,61,298
	2023	1,60,013	38,50,78,574	1,43,599	34,85,11,042
	2024	3,47,584	73,03,98,592	2,84,948	66,98,72,868
	2025	5,18,208	1,04,64,74,409	4,47,173	97,80,72,431
RXIL	2022	1,52,653	18,73,48,727	1,13,236	16,95,31,041
	2023	2,75,541	39,88,95,125	1,98,037	35,52,66,066
	2024	4,05,466	74,39,16,786	3,47,232	70,31,18,574
	2025	4,81,688	98,82,07,411	4,75,942	97,68,93,738
C2F	2024	3959	4039144	3862	3911515.478
	2025	13409	15970555.35	12937	15406895.79
Kredx	2025	148	1478801	101	1076898

Source: Compiled by author

Data Analysis and Interpretation

Descriptive Statistics:

Descriptive statistics were employed to summarise the year-wise evolution of digital supply chain finance for MSMEs within the TReDS ecosystem. The mean values, growth rates, and measures of dispersion were computed for both the number and value of the financed factoring units. The results provide an overview of the scale and variability of MSME financing activity during the study period. The summary statistics of the key variables are presented in Table 2.

Table 2: Description of variables and measurement units

Indicator	Mean	Std. Dev.	Coefficient of Variance	Min	Max
Factoring Units Financed	765567	451903	0.59	2,79,868	13,05,390
Value of Factoring Units Financed (₹ '000)	1,62,54,63,074	1016033131	0.63	52,10,90,152	2,81,59,97,343

Figure 1: Year-wise Trend in Factoring Units and Value Financed

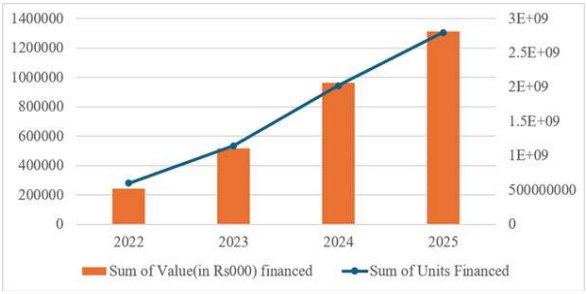


Figure 1 presents the year-wise trends in the number and value of the financed factoring units. Both indicators exhibit evidence of the growth of digital supply chain finance for MSMEs in India, exhibiting an upward trend in both units and value financed on the TReDS platforms, particularly in the latter years of the study period, indicating sustained growth in digital supply chain finance for MSMEs.

Compound Annual Growth Rate (CAGR) Analysis

To assess the pace of growth in digital supply chain finance, the compound annual growth rate (CAGR) was estimated separately for transaction volume and transaction value for the period 2022–2025.CAGR provides a standardised measure of growth by accounting for compounding effects over time. The estimated compound annual growth rates are shown in Table 3.

The results indicate that both the number and value of factoring units experienced strong positive growth. Notably, the CAGR of transaction value exceeds that of transaction volume, suggesting an increase in the average size of MSME financing transactions during the study period.

Table 3: CAGR of Digital Supply Chain Finance on TReDS (2022–2025)

Indicator	CAGR (%)
Factoring Units Financed	67.2
Value of Factoring Units Financed	75.6

Since the CAGR of transaction value exceeds that of transaction volume, H2 is supported, indicating a shift toward higher-value financing transactions within the TReDS ecosystem.

Trend Analysis Using Linear Regression

To examine long-term trends in digital supply chain finance, linear regression–based trend models were estimated at both the aggregate and platform levels. Year was used as the independent variable, while the number and value of the financed factoring units served as dependent variables.

The regression results reveal positive and statistically significant coefficients for the time variable, indicating a sustained upward trend in MSME digital financing activity. The detailed regression results are presented in Table 4. These findings confirmed that the observed growth was systematic rather than transitory.

Table 4: Linear Trend Regression Results (2022–2025)

Dependent Variable	Year Coefficient (β)	t-Statistic	R^2
Units Financed	348,613.2***	15.6	0.992
Value Financed (Rs '000)	783,996,676.1***	16.1	0.992

Notes:

*** $p < 0.01$. Year was the independent variable. Regressions were estimated using OLS.

To formally examine temporal trends in digital supply chain finance, linear regression–based trend models were estimated using year as the explanatory variable and transaction volume and value as dependent variables. The results reveal positive and statistically significant coefficients for the time variable in both models. Specifically, the number of financed factoring units increased by approximately 348,613 units per year (t = 15.60), while the value of financed transactions rose by nearly ¹ 783,996,676 (in Rs '000 terms) annually (t = 16.10). The models exhibit exceptionally high explanatory power, with R^2 values of **0.992** for both specifications, indicating that time progression explains nearly all observed variations in digital supply chain finance activity. These findings confirm the presence of a strong and systematic upward trend in MSME digital financing during the study period.

Figure2: Line plots of units financed and value financed with fitted linear regression lines (2022–2025).

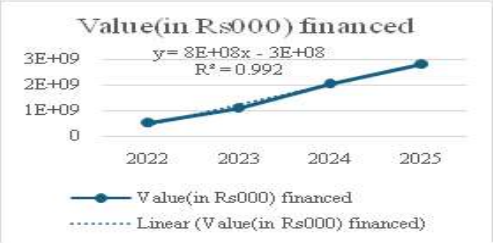


Figure 2 visually corroborates the regression results by illustrating consistently upward-sloping fitted trend lines.

The regression results indicate positive and statistically significant coefficients for the time variable across both specifications, confirming a sustained upward trend in MSME digital financing activity. High R^2 values further suggest that temporal progression explains a substantial proportion of the variation in financing activity. The positive and statistically significant time coefficients provide formal statistical support for Objective 3 and validate H1.

Platform-Level Comparative Analysis

A platform-level comparative analysis was conducted to assess the differences in performance across TReDS platforms. The analysis revealed considerable heterogeneity in both transaction volume and transaction value, reflecting variations in platform scale, market penetration, and participant engagement. While all platforms demonstrate positive growth trends, the magnitude and pace of expansion differ significantly, underscoring the uneven development of digital supply chain financing across platforms.

Figure 3: Platform-wise trends in factoring units uploaded and financed

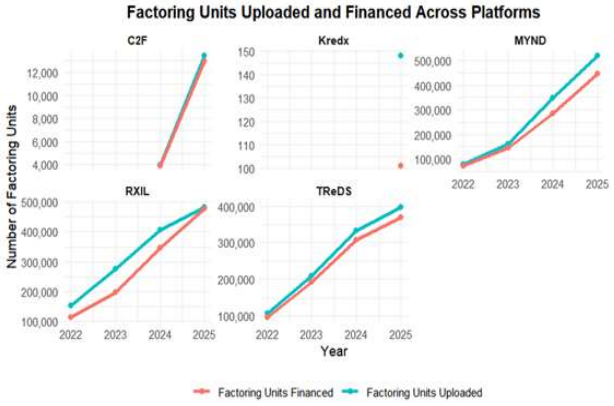


Figure 4: Platform-wise trends in value financed

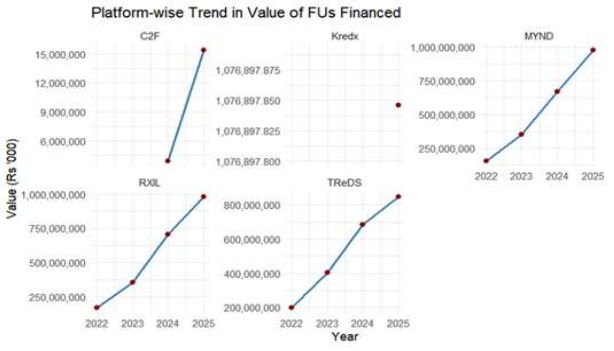


Figure 3 illustrates the platform-wise trends in the number of factoring units uploaded and financed across TReDS platforms over the study period, highlighting differences in transaction volumes and growth trajectories among platforms, with TReDS ltd dominating over the other platforms. Figure 4 presents the platform-wise trends in the value of factoring units financed, enabling a comparative assessment of monetary scale and value expansion across platforms, where each platform is increasing its volume of financing with TReDS leading followed by RXIL and MYND. The observed inter-platform variations in both transaction volume and value support H3, indicating that platform-level characteristics significantly influence transaction performance and growth patterns within the TReDS ecosystem.

Relationship Between Transaction Volume and Value

The relationship between transaction volume and transaction value was examined using correlation analysis and joint trend assessment. The results indicate a strong positive association between the number of financed factoring units and their corresponding values. The Pearson correlation matrix reported in Table 5 suggests that increased transaction activity is accompanied by higher financing amounts.

This finding highlights the complementary growth of scale and value in digital supply chain finance for MSMEs.

Table 5: Correlation matrix

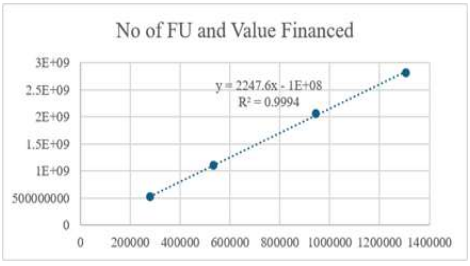
Variable	Units Financed	Value Financed
Units Financed	1	r***
Value Financed	r***	1

Notes:

*** p < 0.01. Pearson correlation coefficient.

A strong positive association indicates that higher transaction volume accompanies higher transaction value.

Figure 5: Scatter plot with fitted regression line



The relationship between transaction volume and transaction value was examined using Pearson's correlation analysis and joint trend assessment. The results reveal a strong positive correlation (r H" 0.999) between the number of financed factoring units and the corresponding transaction value, indicating that increases in transaction activity are closely associated with higher financing amounts. The scatter plot with a fitted regression line (Figure 5) visually confirms this positive association, highlighting the complementary growth of scale and value in digital supply chain finance for MSMEs. These findings provide empirical support for H4.

Conversion Efficiency Analysis

Conversion efficiency was assessed by computing the ratio of factoring units financed to those uploaded each year. This measure captures the effectiveness of TReDS platforms in converting uploaded invoices into financed transactions.

The results indicate a gradual improvement in conversion efficiency over the study period, suggesting enhanced platform maturity and improved financier participation. This trend reflects increasing confidence in the digital supply chain finance.

Table 6: Year-wise conversion efficiency ratios

Year	Average of conversion efficiency
2022	0.85
2023	0.85
2024	0.89
2025	0.89

Figure 6: Trend in conversion efficiency

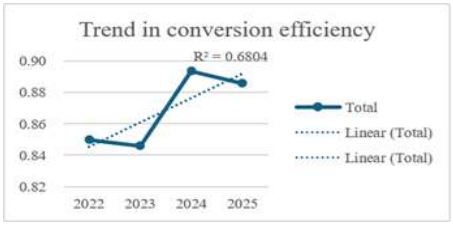


Table 6 reports the year-wise conversion efficiency ratios, capturing the proportion of uploaded factoring units that were successfully financed during each year of the study period. Figure 6 depicts the temporal trend in conversion efficiency, illustrating the progressive improvement in the ability of TReDS platforms to convert uploaded invoices into financed transactions. The observed improvement in conversion efficiency supports H5, confirming that the operational effectiveness of the TReDS platforms strengthened over the study period.

CONCLUSION

This study was conducted to analyse the evolution of digital supply chain finance for MSMEs in India, referring to the data anonymised from TReDS reports to the period between 2022-2025. Using descriptive statistics, estimates of compound annual growth rates, regression-based trend analysis, and assessment of the volume-value relationship and conversion efficiency analysis provide strong evidence of prolonged and systematic growth in activity in MSME digital financing. Both the volume and value of transactions showed significant and steady increases, with the value of transactions showing a more pronounced trend suggesting an increase in the average size of financing transactions over time.

The regression-based trend analysis results confirmed that the observed growth is not episodic but is driven by a significant temporal trend, as reflected in the positive and statistically significant values of the coefficients of the year and the high value of the explanatory power. Moreover, the positive correlation between the volume of transactions and their value is quite high, which shows that both scale and value growth go hand-in-hand in the digital

supply chain finance ecosystem.Collectively, these findings restate that TReDS has gone beyond the horizon of an initial adoption period and is increasingly acting as a scalable financing mechanism for MSMEs.

From the policy perspective, the results underline the effectiveness of digital finance based on platforms for improving access to working capital for MSMEs. Continued expansion in the participation of buyers, more involvement of financiers, and focused support for smaller enterprises could further increase the impact of the TReDS framework. Simultaneously, the concentration of growth across platforms indicates the need for regulatory and institutional measures that support balanced competition and interoperability.

Despite these contributions, this study is limited by certain aspects. The analysis is based on aggregate secondary data and consequently confines firm-level inference and eliminates the possibility of causal inference. Future research could build on the current study by adding micro-level transaction data, examining regional heterogeneity, and assessing the effects on MSME performance (in terms of liquidity, profitability, resilience, etc.) based on digital supply chain finance.

Overall, this research complements the emerging literature on digital finance and MSME development in the following ways: it presents systematic empirical evidence on the growth dynamics of digital supply chain finance in India. The results also characterise the developing role of the TReDS platforms in fortifying the financing of MSMEs while presenting a range of relevant observations on the part of policymakers, regulators, and platform participants keen on additional financial inclusion by way of digital innovation.

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