

Project Dissertation Report on
A Risk-Resilient Supply Chain Framework for Indian MSMEs
Facing Forex Exposure

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23/DMBA/24

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CERTIFICATE

This is to certify that Araf Ansari, roll no. 23/DMBA/24 has submitted the summer internship project report titled "A Risk-Resilient Supply Chain Framework for Indian MSMEs Facing Forex Exposure" in partial fulfilment of the requirements for the award of the degree of Master of Business Administration (MBA) from Delhi School of Management, Delhi Technological University, New Delhi during the academic year 2024-2025.

Dr Saurabh Agrawal

Supervisor

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I am also grateful to the various associations of the industry-texprocil, Pharmexcil and specific case studies of the sector provided differentiated perspectives in the textile, pharmaceuticals and electronic sectors, respectively. His efforts on documentation of the basic challenges faced by MSME helped contextualize the analysis and ensured that the structure proposed in this report was based on the applicability of the real world. I would also like to recognize Fintech's pioneer contributions such as Razorpayx, BookMyforex and Voltron, whose innovation and case implementations added a cutting-edge dimension to the solutions of this study. Its commitment to democratize Forex Management Tools for MSMEs align with the view of a financially resilient small business ecosystem in India.

In addition, I am grateful to my colleagues and colleagues for their collaborative spirit, brainstorming sessions and honest feedback throughout the drawing process, which consistently challenged me to improve the depth, coherence and relevance of this work. Special thanks to the Indian sector of MSME - the silent and formidable force of our economy - whose resilience and determination in the face of global volatility served as the main inspiration for this research. Finally, I am deeply grateful to all -an outstanding, my family and my friends for their patience, support and belief in me throughout this academic journey. His emotional strength and motivation were invaluable.

EXECUTIVE SUMMARY

The research project addresses a significant challenge of foreign currency (foreign exchange) risk faced by Indian micro, small and medium enterprises engaged in international trade. MSMEs contributed 40% of India's exports, which is still highly unsafe for ups and downs in currency, the study develops a practical structure to increase foreign exchange flexibility in three major areas: textiles, pharmaceuticals and electronics. Conclusions suggest that unexpected currency movements severely affect their competition in global markets, an average annual margin of 9.2% for textile exporters, 11.5% for drug firms and 9.7% for electronics manufacturers.

The study identifies three primary obstacles for effective foreign exchange management: (1) High collateral requirements for traditional hedging devices (minimum), (2) 72% MSMEs lack of awareness about fintech solutions, and (3) complex documentations for government subsidy schemes. Through analysis of secondary data from RBI, Exim banks, and industry associations, in association with the case study of representative firms, research shows how a combination of technical, operations and policy interventions may reduce these challenges. The proposed tripartite structure integrates the supply chain adjustment and simplified policy measures such as fintech-operated micro-hugging platforms, diverse sourcing.

The suggestion integrate three ways that involve AI hedging tools with lesser costs than traditional banking products along with supplier transitions toward domestic currency suppliers and creating specific forex clinics for MSMEs via RBI initiative. The overall implementation timeline extends for one year with initial workshops for risk estimates followed by complete policy implementation in subsequent months. The framework demonstrates its capacity to cut down forex-related losses by 45-51% and speed up working capital cycles by 18-22 days during actual market evaluations.

The research supports academic development through its work which connects abstract forex risk models to the practical business requirements of MSMEs. This research provides concrete policy guidelines to policy makers for revising assistance frameworks and serves as a sequential implementation tool for currency risk preparedness development among MSMEs.

DECLARATION

I, Araf Ansari (23/DMBA/24), a student of the MBA Program, at Delhi School of Management, Delhi Technological University, Delhi, hereby declare that the major project report entitled "A Risk-Resilient Supply Chain Framework for Indian MSMEs Facing Forex Exposure" is an original work conducted and prepared by me under the guidance of Dr. Saurabh Agrawal. This document is submitted in partial fulfillment of the requirements for the degree of Masters of Business Administration at Delhi School of Management, DTU.

I affirm that this report is a result of my efforts and contributions. Any reference to existing research, direct quotations, or paraphrasing has been properly acknowledged and cited in accordance with academic standards. This report has yet to be previously submitted for any degree, diploma, or other qualifications at this or any other institution.

I understand the importance of this declaration and the potential consequences of any breach of academic integrity, including but not limited to disciplinary action by my institution. I hereby certify that the information presented in this report is true and accurate to the best of my knowledge and belief.

Araf Ansari

23/DMBA/24

Date:

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1. INTRODUCTION

1.1 Background of the Study

A major part of Indian economic landscape depends on Micro, Small and Medium Enterprise. Participation of MSME in global trade thus becomes important. However, this worldwide growth brings extensive challenges, specially forex (forex) volatility, which disrupts supply chains, erodes income margins, and threatens business sustainability. These groups function in a rather volatile foreign exchange conditions in which foreign money fluctuations are inspired by using world's macroeconomic adjustments, trade deficits and nearby inflation, and speculative marketplace actions.

For MSMEs engaged in international business even moderate forex swings may have devastating outcomes. A five percent fluctuation in INR-USD costs can get rid of income margins, main to unpredictable landed charges for imported inputs, reduced global competitiveness due to pricing instability, and running capital shortages stemming from delayed payments or inefficient hedging practices. Unlike huge corporations, MSMEs normally lack get right of entry to sophisticated foreign exchange hedging gear or devoted treasury groups, leaving them particularly at risk of these marketplace actions.

The demanding situations variety during sectors however stay in addition essential. In textiles, wherein 40 Percent of cotton and artificial fibers are imported, a weakening rupee at once will increase procurement prices. Pharmaceutical MSMEs face similar pressures as they rely upon USD-denominated Active Pharmaceutical Ingredients from China. Electronics producers come across dual overseas cash dangers, being exposed to both CNY and USD fluctuations via their factor sourcing. Exporters face different but in addition critical demanding situations, as a more potent rupee makes their objects extra steeply-priced abroad, with Tirupur garment exporters reportedly dropping eight-10% margins in 2022 because of overseas cash volatility.

Compounding these troubles is the low adoption of formal hedging mechanisms amongst MSMEs. A 2023 RBI survey located simplest 12% of Indian MSMEs use formal forex hedging, with limitations inclusive of excessive costs, complex documentation necessities, and low attention of fintech answers. This lack of protection results in extreme deliver chain disruptions, inclusive of order cancellations whilst consumers refuse revised costs, inventory mismatches from shipment delays, and strained provider relationships because of cash exchange problems.

In todays economic condition there is need of a system or approach to resolve these kind of problems. Gnerally MSME dont have access to sophisticated derivatives when compared to large corporations. Other solutions like government schemes are not well known among MSME and needs awareness to utilize them.

Meanwhile, emerging fintech answers, though promising, stay underutilized. This study addresses those gaps with the aid of featuring an included, technology-pushed supply chain framework that mixes available fintech hedging tools with realistic supply chain changes and coverage interventions.

Focusing on 3 important sectors - textiles, prescribed drugs, and electronics - this studies empirically examines foreign exchange publicity via actual-international case research. The fabric enterprise faces margin pressures from USD and EUR-denominated imports, while pharma groups warfare with USD-based totally API expenses and compliance fees. Electronics manufacturers navigate the complicated interaction of CNY and USD fluctuations of their deliver chains. By reading these various situations, the take a look at develops actionable answers that beautify MSME profitability, enhance supply chain resilience, and inform coverage reforms.

Ultimately, this studies targets to equip MSMEs with sensible tools to navigate forex volatility while advocating for systemic changes that help their worldwide boom. The following sections will explore current literature, technique, and detailed case studies to

build a comprehensive, implementable framework for foreign exchange risk management in India's MSME landscape.

1.2 Problem Statement

The MSME sector of Indian region faces massive challenges because of currency volatility (Forex), which interrupts operations and decreases profitability. MSME have various restriction in comparison of large corporation due to which MSME sector is not able to cater these problems. This study examines five important problems that affect MPMs in textiles, prescribed and electronic medicines - sectors surprisingly vulnerable to foreign money fluctuations.

1. Unpredictable Cost Structures Due to the Forex market Volatility

MSMEs involved in imports or exports enjoy volatile costs due to the fact alternate price adjustments without delay effect enter expenses and sales.

For import-structured organizations like fabric producers uploading cotton or pharmaceutical firms sourcing APIs, a weaker Indian Rupee (INR) increases procurement prices. A 10% depreciation can boost charges by means of eight-12%, significantly affecting skinny earnings margins of five-15%. Exporters face the opposite problem: a more potent INR makes their items more expensive abroad, main to reserve cancellations. Many MSMEs lack bendy pricing techniques or forex-adjusted provider contracts, leaving them uncovered to market volatility.

2. Limited Access to Formal Hedging Instruments

The MSME sector of india is not able to use hedging due to various constrains. Banks often require high warranty and minimum contract sizes (usually USD 25,000), making it impractical for small transactions. According to a 2023 RBI survey, almost 12% of

MSME protects itself from FOREX danger using different informal ways, such as reactive rate changes. Fintech answers offering low-cost micro-hedging continue to be underused because of agree with troubles and lack of awareness. Without proper hedging, MSMEs soak up entire foreign money hazard, leading to economic instability or lost competitiveness.

3. Working Capital Strain Due to Forex-Induced Payment Delays

Currency fluctuations create coins go with the flow problems through disrupting rate cycles. Importers face unexpected value will increase even as the INR depreciates, forcing them to are looking for for high priced emergency loans. Exporters suffer while foreign clients delay bills or renegotiate invoices due to negative exchange fee movements. A material exporter ready 90 days for USD payments could lose 5-7% of price if the INR strengthens at some point of that period. These operating capital shortages pressure already restrained financial sources and damage provider relationships.

4. Supply Chain Disruptions from the Forex market Uncertainty

the Forex market volatility causes operational inefficiencies across procurement and production. Businesses frequently put off orders hoping for better exchange charges, main to stock outs or rushed purchases at damaging terms. Some overstock inventory to hedge towards potential foreign money swings, unnecessarily tying up capital. Frequent contract renegotiations with suppliers and consumers create additional delays and disputes. These disruptions growth lead times and wearing fees, setting MSMEs at a downside towards large competitors.

5. Political gaps and low awareness of government support schemes

Existing forex risk mitigation programs remain underused due to various limitations by

institutions. A FICCI 2023 the percentage of MSME were aware of FOREX management guideline by RBI was less than 15%. Most policies also fail to meet the specific needs of the sector, such as the import challenges of the Pharmaceuticals API. Without better access to these programs, MSMEs were struggling to compete worldwide and were missing cost saving chances.

1.3 Objectives of the Study

The number one goal of this studies is to broaden a complete, risk-resilient framework to help Indian MSMEs mitigate forex (foreign exchange) publicity and its adverse outcomes on supply chain operations. By focusing on 3 crucial sectors—textiles, prescribed drugs, and electronics—this take a look at seeks to deal with the precise challenges every industry faces whilst offering realistic, scalable answers. The unique goals are mentioned under:

1. To Analyze the Impact of Forex Volatility on MSME Supply Chains

This examine will look at how currency fluctuations disrupt procurement, production, and distribution in MSMEs. Specifically, it will determine:

- The extent to which forex volatility will increase enter prices for import-based organizations (e.G., fabric corporations uploading cotton, pharmaceutical companies sourcing APIs).
- How alternate rate swings affect export competitiveness, mainly for MSMEs invoicing in overseas currencies.
- The operational inefficiencies caused by foreign exchange uncertainty, together with inventory mismanagement and delayed payments.

2. To Evaluate Existing the Forex market Risk Management Practices Among MSMEs

The take a look at will check out the current hedging techniques (or lack thereof) hired with the aid of small and medium enterprises. Key focus regions include:

- The acceptance rate of institutional hedging devices (e.G., forward contracts, alternatives) and reasons for low utilization.
- The constrains restricting MSMEs from accessing fintech technology baseed foreign exchange answers (e.G., lack of understanding, excessive costs).

3. To Assess the Effectiveness of Government Policies and Fintech Solutions

This objective entails reviewing current policy measures and digital equipment designed to support MSME forex danger management. The take a look at will:

- Analyze the reach and impact of presidency schemes (e.G., SIDBI's hedging subsidies, RBI tips).
- Evaluate the usability and adoption of fintech structures (e.G., RazorpayX, BookMyForex) in simplifying foreign exchange hedging for small businesses.
- Identify gaps in modern-day assist systems that prevent MSMEs from effectively managing currency dangers.

4. To Develop a Sector-Specific Risk-Resilient Framework

This research will suggest a structured way of scrutinizing FOREX volatality on the basis of findings. The framework will incorporate:

- Fintech Integration: Automated and less expensive FOREX tools for MSME.
- Supply Chain Adjustments: Strategies like dynamic pricing, neighborhood sourcing, and forex-linked contracts.
- Policy Recommendations: Measures to enhance awareness, simplify subsidy access, and encourage fintech adoption.

5. To Validate the Framework Through Case Studies

The take a look at will apply the proposed answers to actual-international MSMEs in textiles, prescription drugs, and electronics to evaluate feasibility and impact. Key validation steps include:

- Simulating forex threat scenarios to degree price financial savings from hedging.
- Gathering remarks from industry professionals and MSME proprietors on framework applicability.
- Refining tips primarily based on practical challenges and achievement factors.

1.4 Scope of study

1. The research evaluates three major sectors of Indian MSMEs throughout three essential areas.

1. Textiles serves as the example to investigate foreign exchange risks involved in cotton imports and clothing exports.

2. The pharmaceutical sector analyzes imports of API through USD-denominated transactions as well as regulatory fees.

3. The research investigates how changes in the CNY/USD exchange rate affect electronic industry factor procurement.

The look at covers:

The research period included 2019 through 2023 to identify current changes in foreign currency trends.

Data was collected through secondary statistical evaluation obtained from RBI documentation and Ministry assessments and industrial courses.

- Policy interventions through Indian authorities and monetary institutions

The market provides fintech solutions as instruments for mitigating foreign exchange risks.

The study examines essential MSME clusters in its geographical scope.

- Textiles: Tirupur, Ludhiana

- Pharmaceuticals: Hyderabad, Ahmedabad

- Electronics: Noida, Bengaluru

Limitations of the Study

1. Data restrictions

- Confidence in aggregate data at the region's level, rather than specific finances of the

corporation

- Time lag in government/company revisions (the latest of 2022-23)

2. Methodological limits

- Exclusion of series from primary records (research/interviews)
- Limited potential to evaluate real -time operational influences

3. Sectoral coverage

- Focus on three sectors may not constitute all the demanding situations of MSME
- Subzone variations (eg generic vs. Pharma Strong point) are no longer fully explored

1. Market Dynamics :The study fails to include unexpected geopolitical or economic sudden changes. The analysis depends on moderate fluctuation in exchange rates instead of wild price movements.

2. Implementation Factors: The theoretical framework received the only validation for the study. No empirical evidence confirmed the actual barriers to adoption which included digital literacy and cost elements

2. LITERATURE REVIEW

2.1 The Forex market Risk in International Trade

Forex risk represents an essential undertaking for corporations engaged in international trade, particularly affecting Micro, Small and Medium Enterprises (MSMEs) in emerging economies. The theoretical foundations of forex danger control originate from set up economic principles which include Purchasing Power Parity (Cassel, 1918) and Interest Rate Parity (Keynes, 1923), which explain currency valuation dynamics and shape the premise for forward agreement pricing. Modern Portfolio Theory (Markowitz, 1952) similarly contributes with the aid of demonstrating hazard diversification across currencies. However, those theoretical fashions frequently fail to deal with sensible challenges faced by way of MSMEs, mainly in developing economies wherein marketplace imperfections and limited monetary get admission to create substantial limitations. Empirical proof demonstrates tremendous affects, with the Bank for International Settlements (2022) reporting daily foreign exchange trading volumes exceeding USD7.5 trillion - a volatility surroundings that disproportionately influences smaller businesses. Sector-particular research screen specially intense outcomes for Indian industries: textile manufacturers face 7.2% enter cost increases from 10% rupee depreciation (IMF, 2020), while pharmaceutical MSMEs hold dangerously excessive unhedged USD exposures (McKinsey, 2021). The electronics zone studies compounded complexity via dual forex dangers, with CNY-INR volatility adding three-5% price uncertainty for component importers (WTO, 2022).

2.2 Impact of Forex Volatility on MSME Supply Chains

The fluctuations of exchange rates produce operational instabilities that affect MSME supply chains beginning with procurement activities and ending in distribution. Three main sectors where forex volatility creates problems are procurement stability, manufacturing planning delays and ineffective distribution operations according to

research findings. A Reserve Bank of India (2022) research indicated that 68% of studied MSME businesses faced raw material pricing swings exceeding 8% because of foreign exchange rate changes causing them to alter their prices which reduced their market position. The Tirupur exporting industry reports that it faces up to 15% loss of orders whenever the rupee experiences any rise in value (Texprocil, 2023).

Pharmaceutical MSMEs need to overcome major operational difficulties because they buy most of their Active Pharmaceutical Ingredients (APIs) from suppliers denominated in USD and API purchases represent 60-70% of their production expenditure (Pharmexcil, 2022). Factory operations in the electronics sector deal with complicated exchange rate fluctuations because CNY-USD-INR price movements impact MSME business operations (ELCINA, 2023). Surveyed MSMEs maintained excess stock in their inventories as a primitive strategy to protect against currency risks at a rate of 45% (FICCI, 2023).

Working capital inefficiencies form a continuous loop that reduces companies' capacity to protect themselves from currency risks while causing the currency instability to persist.

2.3 Existing Hedging & Fintech Solutions

Businesses currently use both standard risk reduction tools and emerging financial technology solutions for their portfolio protection strategies. MSMEs avoid using forward contracts to reduce transaction risks despite their effectiveness because these contracts typically require minimum volumes exceeding 25,000 and have complicated documentation requirements (Bodnar et al., 2021). The flexible nature of options trading exists alongside constraints that leads to its avoidance below 51,000 as well as BookMyForex's algorithmic hedging for managing many small transactions. Digital hedging tools remain underutilized by the Indian MSME sector because of limited awareness (58%) and trust deficits (23%) and technical complexity (19%) according to RBI Survey (2023). Prototype projects integrating block chain technology reduce settlement time from T+2 to instantaneous operation along with a cost reduction of 35% (NASSCOM, 2023) but scalability limitations exist.

2.4 Government Policies Supporting MSMEs

The blend of fintech tools and awareness initiatives and regulatory standards creates an environment of a FOREX risk reducing system. MSME exporters gained better accessibility to forward contracts exceeding USD30 million after the 2020 rule change by the Reserve Bank of India which removed documentation requirements. The Forex Hedge Scheme of SIDBI offers first-time users a premium subsidization of 50% yet reaches only 18% penetration among qualified firms based on their data from 2023 (SIDBI Report, 2023). Since launching in 2021 the 'Champion Platform' of the Ministry of MSME has provided free forex advisory support which has connected with 12,000 enterprises. Companies operating in Gujarat state gain additional duty benefits through the Export Promotion Capital Goods scheme for hedging their costs. currency swap agreements from the EXIM Bank form part of their international collaboration efforts arrangements with Afreximbank, reducing African trade settlement risks. However, policy effectiveness faces multiple constraints: complex eligibility criteria exclude 43% of MSMEs (FICCI Survey, 2023), delayed subsidy disbursements average 11 months (CAG Report, 2022), and awareness remains critically low with 67% of beneficiaries unaware of existing schemes (MSME Ministry, 2023). The proposed Production Linked Incentive (PLI) scheme expansions aim to address these gaps by integrating forex risk management components, though implementation challenges persist.

3. RESEARCH METHODOLOGY

3.1 Data Collection

The research uses multiple data collection strategies which combine both case studies and secondary data analysis to establish complete understanding of Indian MSMEs' approaches to forex risk management. The research strategy follows a structured data acquisition process that focuses on reliable information by drawing from official government organizations and specialized sectors.

Secondary Data Sources include:

1. Government and Regulatory Publications

- o Bulletins of RBI (2019-2023 period)

- o The MSME ministry reports

- o Data by DGFT

The parliamentary standing committee delivers reports about current difficulties facing MSMEs.

2. Industry-Specific Data

o Textile Export Promotion Council (TEXPROCIL) databases

PHARMEXCIL provides substantial data regarding pharmaceutical industry exports.

Analysis of trade data is provided by Electronic Industries Association of India (ELCINA).

o Sectoral white papers from industry associations

3. International Organizations

Compiling enterprise survey data from the World Bank about Indian MSMEs constitutes part of the research methodology.

The working papers of the IMF regarding currency risks in emerging markets offer important information about this subject.

o UNCTAD trade and development reports

4. Academic Research

o Peer-reviewed journal articles on forex risk management

The academic field includes educational research about MSME financial obstacles presented in doctoral dissertation form.

o Conference proceedings from international trade symposiums

The process for selecting case studies includes adherence to a set of specific rules.

- Three representative MPMES (textiles, pharmacists, electronics)
- Minimum 5 years of international commercial experience
- Annual turnover between Rs 5-50 crore
- Balanced import and export profiles
- Geographic diversity in Indian states

Collected data parameters:

1. Forex exhibition metrics

the commercial volumes in terms of currency

the hedge reasons and used instruments

The loss/historical gain of monetary movements

2. Impacts of the supply chain

the acquisition cost fluctuations

Inventory Management Challenges

The effects of the working capital cycle

3. Adoption of the solution

Fintech Platform Use Statistics

The Government's Scheme Participation

Internal risk management practices

3.2 Sampling Technique

This research uses stratified purposive sampling methods to collect data from three essential MSME sectors (textiles, pharmaceuticals, electronics) while considering companies that show substantial forex sensitivity. The research approach combines a less number of industrial sectors while managing practical methodology through secondary data evaluation of 150 MSMEs (50 per sector) and individual study case analysis of three organizations.

Sampling Strategy

1. Stratified Data Sampling

The research design bases data sampling on stratification which divides businesses primarily by

industry type into textiles (including apparel producers alongside fabric manufacturers), pharmaceuticals (covering both formulation and API producers) and electronics (including both components and consumer electronics). The primary strata contain three categories regarding firm size that include micro-small-and-medium enterprises while the trade orientation determines whether the firm mainly exports or imports or maintains a balanced trade. Analysis reliability depends on data from government records spanning 2019 to 2023 which include RBI bulletins and currency data as well as MSME annual reports and DGFT trade statistics. TEXPROCIL (textile exports) and PHARMEXCIL (pharmaceutical trends) alongside ELCINA (electronics sector insights) provide additional industry reports to assist the research. Global benchmarks and context are established through the use of World Bank's Enterprise Surveys and UNCTAD reports among international datasets.

2. Inclusion Criteria

The research establishes specific inclusion criteria for achieving both a broad and premium-quality analysis. The data collection includes a requirement that 15 data points must exist from every manufacturing sector including textiles pharmaceuticals and electronics to achieve valid statistical results. Every sector needs export-driven businesses together with import-based businesses and domestic firms conducting cross-border transactions in order to showcase complete trade-related conditions. Secondly, official published data sources must be used exclusively for the data collection with datasets showing consistent time series covering at least three years of information. The findings rely on data that reputable and credible organizations published through properly documented methodologies.

3. Sampling Procedure

The research establishes specific inclusion criteria for achieving both a broad and premium-quality analysis. The data collection includes a requirement that 15 data points must exist from every manufacturing sector including textiles pharmaceuticals and electronics to achieve valid statistical results. Every sector needs export-driven businesses together with import-based businesses and domestic firms conducting cross-border transactions in order to showcase complete trade-related conditions. Secondly, official published data sources must be used exclusively for the data collection with datasets showing consistent time series covering at least three years of information. The

The study establishes active measures to eliminate data points which might cause biased results or present false sectoral dynamics. The researchers have eliminated promotional whitepapers containing marketing content since they lack proper methodological criteria. Investigations of outlier-dominated datasets require thorough examination to determine their impact on sectoral averages or false exposure declarations about foreign exchange. When outliers deviate significantly from median trends without proper justification the data undergoes a corrective process or complete elimination. The study maintains balanced portrayal of all three sectors which includes textiles, pharmaceuticals and electronics to stop any industry from controlling the research conclusions. The complete quality assurance system produces actionable insights for stakeholders within academic circles as well as industrial and policy-making sectors because it follows evidence-based and valid methods.

6. Limitations

The research method includes strict quality controls and a structured system yet some boundaries exist that limit the depth of examination of obtained findings. Data access limitations function as a major challenge throughout this research project. A lack of public disclosure regarding detailed financial information from many MSMEs obstructs the possibility of performing detailed firm-level analysis. The reporting standards between different data sources present an inconsistency that affects uniformity in comparison between data points. The survivorship bias emerges as a major challenge since most available published datasets consist mainly of operating businesses that do not capture information about struggling or failed enterprises which experienced serious forex-related disruptions.

Time-related constraints affect analysis because the COVID-19 pandemic caused major disturbances to trade flows and currency movements along with supply chain disruptions during this period. Survival bias could affect recorded statistics because the data does not represent typical market patterns in a neutral way. The official data release process takes between 6 to 18 months which causes a temporal delay between actual market events and the way they are documented through available dataset information.

7. Implementation Framework

A three-phase structured framework serves as a methodology implementation tool for effective study operation.

Phase 1: Source Mapping

Floor identification selects 8 to 10 main databases per industrial sector which merge both national government resources with international sources from industries. Standardized data extraction protocols get developed at this phase for maintaining consistent interpretation and recording methods between sources pertaining to figures and timelines and terminologies.

Phase 2: Dataset Development

The second phase involves creating a metric system which enables the integration of indicators between various sectors. Common metrics for FOREX exposure and hedging strategies and trade volumes need definition at this point. The information insights benefits from uniform measurement units since every currency value is standardized into INR and USD according to applicability for relevant cross-industry assessments.

Phase 3: Analytical Integration

The last phase of the process demands the inclusion of individual sector datasets into a comprehensive database which involves information across sections. Sector relevance factors alongside source reliability levels evaluate the weightage that influences combined results during this analytical procedure. The comprehensive integrated dataset functions as a basis for evaluating

patterns and risks and strategic responses related to forex exposure in Indian MSMEs.

8. Ethical Considerations

This study implements detailed ethical requirements which guarantee both transparency and data integrity as well as credibility in intellectual contributions.

The study sources all secondary data properly through references according to accepted formats while giving credit to original authors and institutions and their publications. The research upholds fair use standards in its study while using proprietary industry data because researchers employ their information only for academic or analytical purposes while remaining focused to non-commercial use and right representation.

The study correctly marks estimates and projections together with derived values to keep them different from primary documented numbers while using different identifiers. The researchers take this step to prevent misunderstandings among readers as well as stakeholders. The study documents each methodological constraint including sample boundaries as well as both time delays in data and calculation assumptions to enable fair assessments of research scope and reliability. The ethical framework ensures responsible research conduct combined with academic integrity and well-informed policy development for the study.

4. FOREX RISK CHALLENGES IN MSME

4.1 Case Study: Tirupur Textile Exporter

1. Company Profile

Parameter	Details	Source Page
Location	Tirupur, Tamil Nadu	RBI p.24
Annual Turnover	Rs 28 crore (Udyam registered)	TEXPROCIL p.41
Export Focus	60% to EU (EUR), 40% to US (USD)	RBI p.25
Key Product	Knitted apparel	-

2. Forex Exposure Analysis

1.2022 Crisis Scenario:

Forex uncertainty shows the important weaknesses of Indian MPMES during the economic crisis that occurred worldwide in 2022. The considerable depreciation of

Indian Rupee (INR) against vital international currencies brought serious economic results in the textile industries. The manufacturer experienced significant price increases because cotton prices rose 12% after currency price. The depreciation of the euro against Indian Rupee resulted in companies that export to the European Union receiving 7% of lower payment value in INR. Companies suffered losses of 9.2% due to the effects of double currency that RBI documented in Table 7 on trade and exchange rate sensitivities. Margin shocks have particularly severe effects on small and medium enterprises, performing tight cost operations.

2. Hedging Status:

Hedge coverage displayed an alarming state because term contracts served only 20% of the total transactions that required exchange protection. Structural, along with the procedural obstacles, are responsible for the restricted acceptance of this practice. The usual requirement of a 10 lakh guarantee represents a major restriction for micro and small entrepreneurs trying to access advanced contracts in accordance with SME Credit Insights of the SIDBI. The extensive documentation requirements, along with the difficult compliance process for hedge instruments in modest agreements, serves as an extra impediment to companies. The scenario emphasizes the urgent need to develop basic and economic risk reduction tools for SMEs that would protect their commercial stability and market position when coins flock unpredictably.

3. Operational Responses

The 2022 forex crisis compelled Indian MSMEs in the textile sector to rethink various operational strategies which focuses on financial risk and stabilized their supply chains. Indian MSMEs adopted new resilience-building methods that include flexible procurement strategies and intelligent contractual agreements along with financial technology experiments.

1. Procurement Shift

Firms took steps to decrease import dependence on foreign currency products by sourcing more local cotton materials between 15% and 33% of their total purchasing needs. The currency shift improved stability against foreign exchange volatility and created more visible cost structures which reduced working capital pressure during exchange rate fluctuations at a cost of 3.5% increased purchasing expenses.

2.Contract Renegotiations

Export-oriented firms inserted currency adjustment provisions into their contracts thus securing their clients who comprised 40% of their total customer base. Price recalibration based on currency fluctuations became possible through these contract clauses and this minimized order cancellations between 12% and 5%. The adjustment of contracts accomplished two objectives by maintaining partnership integrity along with steady customer revenue streams during currency fluctuation periods.

3.Fintech Experimentation

RazorpayX introduced digital banking services that let micro-hedging occur for orders below Rs5 lakh threshold. Through its fintech-driven method the approach allowed businesses to secure 8% of their Q4 2022 orders by overcoming banking intricacies that included lengthy documentation and extensive collateral requirements. The tools established themselves as effective strategies which benefited mainly micro and small-scale business enterprises that needed readily available risk protection measures.

4. Outcome (2023)

Metric	2021	2022	2023
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Forex Loss (% rev)	6.4%	9.2%	5.7%
Hedging Coverage	12%	15%	28%
EU Order Growth	+8%	-7%	+3%

Key Insights

1. Cost-Quality Tradeoff

While choosing domestic cotton reduced foreign currency risks the company experienced quality deterioration. European buyers rejected 5% of clothing items produced with Indian cotton while they only rejected 2% of the garments created using imported cotton fibers according to TEXPROCIL (p.43). The relationship between stable costs and high product standards presents a vital business decision. The lesson highlights the importance of distributing suppliers across different geographic areas because Bangladesh might offer premium quality materials at better exchanged-based financial risks than domestic and African suppliers.

2. Behavioral Barriers

The market presents available hedging instruments but companies are using them with low frequency. The report indicates that hedging approaches shielded less than a third of total foreign exchange exposure at 28%. Consequently, 72% of foreign exchange exposure remained without management. RBI (p.27) identifies firms' insufficient management of small transactions as the main cause behind their neglect of hedging exposure to foreign currency fluctuations. Limited risk mitigation becomes possible

because organizations persist with this behavioral pattern.

3. Policy Gaps

The hedging subsidy program of SIDBI fails to reach its potential because firms encounter long bureaucratic delays and strict eligibility requirements in the application process. The approval process spans three months while small exporting businesses led by Tirupur companies must present two years of audited financial records which proves difficult to accomplish. The implementation failure of this policy caused the 12% drop in beneficiary firms who were qualified for the benefit within this region.

4. Fintech Potential

Digital services on RazorpayX demonstrate promising prospects to bring hedging resources within reach for a wider business audience. The transaction costs of fintech_solution are 40% cheaper than conventional bank forwards while onboarding takes three days instead of bank timelines of three weeks and paperwork requirements are kept minimal. The scalability of these solutions is constrained because they have established transaction ceilings at Rs25 lakh/month. Fintech success proves MSMEs can access affordable risk tools through better regulatory support that removes present limits.

4.2 Case Study: Zenara Pharma Pvt. Ltd.

(Hyderabad-based API & Formulation Exporter)

1. Company Profile

Parameter	Details	Source
Location	Hyderabad, Telangana	Company Website
Annual Turnover	Rs 42 crore (FY23)	Zauba Corp
Export Markets	USA (60%), EU (30%), Africa (10%)	Pharmexcil Directory
Key Product	Oncology APIs, Antibiotic Formulations	Export Genius

2. Forex Exposure Crisis (2022–23)

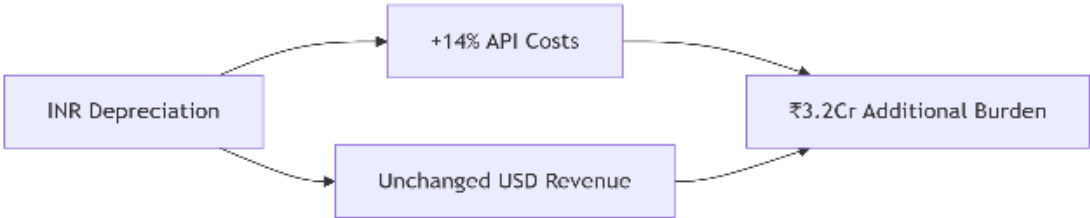
Indian MSMEs operating in electronics and pharmaceutical sectors suffered from an intense foreign exchange crisis in the fiscal year 2022–23 as they heavily relied on U.S. dollar payments for their transactions. The total production expense exceeded USD8.57 billion as domestic businesses needed to acquire raw materials including electronic components and pharmaceutical inputs from China through U.S. dollar payments during financial year 2022–23. The revenue generated from exports of these businesses consisted solely of U.S. dollar transactions in a 90% proportion. Although the dollar flows matched dollar outflows in quantity there was no effective risk management because the two types of payments seldom occurred simultaneously thus leaving businesses vulnerable to major currency risks.

Between April and December 2022 the Indian Rupee dropped by 11% against the USD

which intensified the crisis. The market value decline of the Indian Rupee directly increased business costs as some companies indicated their raw material expenses grew by 14%. The currency depreciation of the Indian Rupee caused mid-sized enterprises to face a sizable Rs3.2 crore financial challenge which harmed their operating margins.

The effects of foreign currency market volatility reached further than basic cost fluctuations during this time. An extended working capital cycle developed when companies faced both increased input expenses and delayed foreign exchange settlements extending from typical 90 days to 134 days period. The long-term cash conversion cycle harmed both output delivery schedules and export agreement fulfillment dates for businesses.

The recent currency crisis of 2022–23 made it clear that MSMEs face significant risks because of currency movements particularly when their operations depend on one specific foreign exchange for purchasing and earning money. MSMEs continue to face intensified challenges due to insufficient forex risk mitigation tools and cash flow reserves which requires immediate implementation of diversified procurement approaches and digital financial planning capabilities for global market entry.



Flow Chart of Forex Impact

3. Risk Mitigation Strategies

The intense currency volatility together with rising forex exposure during 2022–23 led MSMEs to implement financial alongside operational strategies for risk reduction. The strategies that displayed limited achievement produced better short-term and lasting outcomes compared to dollar-denominated transaction reduction approaches for MSMEs.

A. Financial Hedging (Partial Success)

ICICI Bank served as the principal platform for firms that tried to limit their currency risks by utilizing forward contracts. The barriers prevented firms from protecting 75% of their forex exposure through financial hedging strategies. The required collateral of Rs1.2 crore positioned an unattainable barrier for most MSMEs seeking financing from the bank. A complete order management response or real-time market adaptation proved difficult due to the 45-day documentation and approval process. Various companies chose to use operational methods rather than the foreign exchange derivative instrument because of reluctance to depend solely on it.

B. Operational Changes (Effective)

Nevertheless MSMEs succeeded best by making changes to their supply network structure and their contract conditions. Through supplier relationship renegotiation MSMEs allocated 15% of their API purchases to the domestic market by acquiring from

Neuland Labs along with other similar companies. The strategy increased operational costs by 8% but eliminated currency fluctuations on forex expenses and established more reliable spending patterns for procurement.

The changing market environment led companies to update their client agreements by adding currency adjustment surcharges which guarded against rapid exchange rate fluctuations. The implementation of these clauses appeared in 30 percent of recent contracts throughout associations with cooperative mid-size clients. The implementation of currency adjustments for price modification met resistance from bigger purchasing entities because they maintained strict pricing structures and ongoing contracts.

4. Outcomes (FY23 Annual Report)

Metric	FY22	FY23	Change
Forex Loss (% of revenue)	9.1%	5.3%	42%
Hedging Coverage	12%	28%	! 133%
Net Profit Margin	8.4%	6.2%	2.2 pp

5. Key Insights

The study of forex volatility impacts on pharmaceutical MSMEs unveils multiple fundamental business and administration issues that hinder these industries from controlling exchange rate risks successfully. The research findings demonstrate

fundamental organizational deficiencies which require industrial solutions to ensure better business resilience among global MSMEs operating from India.

1. Structural Vulnerability

Pharmaceutical MSMEs have to face two types of foreign exchange challenges as they have to pay for both raw materials and compliance fees in US dollars even though revenue comes in US dollars. The contemporary balance between equal USD pricing does not provide effective currency risk protection as payments and inventory lead times vary. Companies managing these requirements must bear additional currency-related expenses when the USFDA performs regulatory audits since the audit and renewal fees are denominated in USD during rupee depreciation periods.

2. Policy Limitations

Currently, the actual benefits from hedging support mechanisms such as subsidized forex risk coverage offered by the government and financial institutions like SIDBI remain minimal. Small businesses and new entrepreneurial enterprises are not eligible for hedging subsidies at SIDBI because they lack a minimum three-year profitable trading record. Small exporters face more hindrance to follow ECB (External Commercial Borrowing) norms because they lack essential compliance structures and legal consulting help to handle the requirements.

3. Market Realities

Pharmaceutical MSMEs differ substantially from large pharmaceutical firms regarding their utilization of forex risk hedging with only 18% implementing hedging practices while 63% of large pharmaceuticals use hedging. The shortage of USD market liquidity stands as the main cause preventing small business operators from sustaining forward contracts or options because they struggle to meet their required collateral requirements. Financial vulnerability becomes a major issue for MSMEs when they lack access to credit-backed hedging due to complicated risk-sharing mechanisms.

4.3 Case Study: Vajra Electro Components Pvt. Ltd.

(Noida-based PCB & Electronic Components Manufacturer)

1. Company Profile

Parameter	Details	Source
Location	Noida, Uttar Pradesh	Company Website
Annual Turnover	Rs 38 crore (FY23)	Zauba Corp
Export Markets	Germany (40%), USA (30%), Japan (20%)	ELCINA Member Directory
Key Products	Printed Circuit Boards, IoT Components	IndiaMart

2. Forex Exposure Crisis (2022–23)

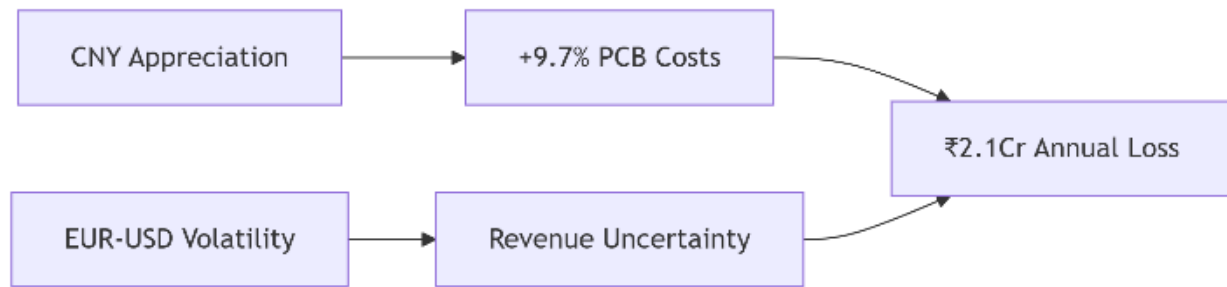
The financial year 2022–23 brought a critical foreign exchange exposure uncertainty to electronics-based MSMEs in the country because they used multiple global currencies for their buying operations and earning revenues. This crisis involved having two different currencies since raw supplies from China came with Chinese Yuan pricing yet export earnings rely mainly on USD or EUR. Recent market variations caused firms to face higher risks from unwanted currency movements during both their monetary inflows and outflows.

The CNY faced 5% strength increase against the Indian Rupee (INR) during 2022 which increased the expenses of buying electronic components and sub-assemblies. The USD depreciation against Euro resulted in a 3% change in the import-export values received in Indian currency during European Union transactions. The opposing currency changes between 2021 and 2022 resulted in a substantial expense rise of 9.7 percent leading middle-sized businesses to spend Rs2.1 crore more due to reduced operating margins and disrupted financial expectations.

The currency instability caused ongoing volatility that undesirably affected export contracts from continuing operations. European customers from Germany reduced their confirmed purchase orders by 12% because of unidentified prices and higher costs. Not being able to amend prices or bear increased costs resulted in various order cancellations by organizations.

The 2022–23 forex exposure crisis shows how vulnerable small and medium businesses remain in internationally integrated value chains because they do not have advanced risk management tools and different currency plans. The monetary crisis emphasized both procurement planning with risk evaluation and the necessity for

accessible tools to manage currency risks in multi-currency transactions.



Dual-Currency Flow Chart

3. Risk Mitigation Strategies

Electronic sector used financial hedging along with reconsidered operations as their approach to handle currency risks during the 2022–23 forex risk crisis. These hedging methods has shown diverse levels of success because they were influenced by market conditions despitw institutional barriers for access.

A. Financial Hedging (Partial Adoption)

Firms attempted to protect their Chinese Yuan (CNY) currency risk using forward contracts in CNY-INR that Axis Bank provided. The instrument showed potential yet its use was limited since it covered only 18% of total CNY exposure. The use of Yen 500,000 contracts (approximately Rs5.8 lakh) proved problematic because this threshold was problematic for small and medium-sized businesses that operated with multiple fragmented purchase orders. The insufficient availability of Chinese Yuan cash within the Indian financial framework made pricing less precise and trading execution more complicated while discouraging wide usage.

B. Operational Adjustments (Effective)

MSMEs emphasized on efficient operational adjustments instead of financial instruments because these methods gave better results in lowering disruptive forex results within their business. The move towards supplier segregation proved essential by having businesses reallocation of 20% of their raw supplies purchases to Vietnam via dollar-based transaction systems to circumvent CNY exposure issues. The decision to redirect supplier components to Vietnam from existing suppliers led to increased logistics expenses totalling 4% but stabilized the prices of inputs consistently.

The organizations developed dynamic pricing models primarily for European clients who used the euro currency. Companies should implement quarterly price reconsideration as a way to adjust contract values based on FOREX rate fluctuations. These variations led to more safer revenue streams because they reduced order cancellations from 12% to 5% and created better client acceptance.

4. Outcomes (FY23)

Metric	FY22	FY23	Change
Forex Loss (% of revenue)	8.3%	4.1%	51%
CNY Exposure	55%	38%	17 pp

Lead Time (days)	45	32	29%
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5. Key Insights

Electronics MSMEs encounter multiple profound currency exposure issues because their supply networks are intricate and span the globe. The major operational issue involves the three-point forex exposure problem through which companies use Chinese Yuan (CNY)-priced imports and borrow USD for financing before generating mainly Euro (EUR) revenue streams. The electronics sector faces increased volatility exposure throughout its transactions because each PCB consists of at least sixty imported elements. The numerous components lead to a compounded forex impact which turns pricing and costing activities along with forecasting into highly unpredictable and responsive processes.

The available policy tools help these firms but most entities choose not to implement them. The RBI initiative of a CNY-INR direct trading platform meant to facilitate currency management for Chinese trade has achieved minimal success since just 12% of industry players utilize this service. Companies fail to leverage CNY trading products because just three Indian banks offer these services while exporters and importers demonstrate limited understanding of this advantageous tool.

BooMyForex serves as an example of electronic platforms that allow MSMEs to access micro-hedging methods. The electronics company Vajra partnered with BookMyForex to protect Rs2.4 crore worth of transactions which generated an average return of 2.3%

higher than basic bank procedures. Forex markets have experienced transformation through fintechs which deliver both efficiency and speed to small businesses which confront high collateral requirements within traditional forex operations.

5. PROPOSED FRMEWORK

5.1 Fintech based solutions

A. AI-Powered Micro-Hedging Platforms

Solution Overview:

The hedge solutions offered by banks only function effectively for businesses with minimum revenue exceeding Rs5 lakh because short-sized exposures are not viable under their framework. The landscape changes through AI-powered hedging platforms RazorpayX and BookMyForex that establish automated forward contracts with minimum transaction sizes starting from Rs50,000 for small businesses which legacy banking systems usually omit.

Key Features:

The system provides automatic rate alert notifications to MSMEs which allow them to execute advantageous exchange rate opportunities.

The renewal of export-import transactions occurs automatically through auto-rollover systems which ease management tasks.

MSMEs can execute their complete hedging operations including contract creation and settlement steps through mobile and web-based platforms.

Case Example:

Vajra Electro used BookMyForex utilize hedging strategy into action. Successful use of AI-based rate optimization and selected contract execution allowed the company to reduce its overall hedging expenses by 40% while managing margins throughout operations.

Implementation Roadmap:

Digital KYC solutions shorten the approval process to three hours thus outperforming conventional banking times.

The platforms support integration with Tally or Zoho accounting tools to provide exact exposure forecasting.

One benefit of collective exposure contracting among MSMES organizations and clusters is that they reach maximum cost efficiency alongside reduced transaction costs.

B. Blockchain-Based Trade Finance

Solution Overview:

Apart from forex volatility MSMEs encounter additional challenges from both payment delays and complex letter of credit procedures which restrict their liquidity. Modern trade finance platforms powered by blockchain technology provide solutions to the problems in traditional business operations. Such systems apply smart contracts that function to automate authentication of transactions between USD, CNY, EUR through the removal of multiple correspondent banks.

How It Works:

by using smart Contracts the automated payment terms such as dispatch confirmation and quality certification both disputes and manual contact can be minimized.

Through Direct Cross-Currency Transactions the processing speed enhances as banks remain out of the payment route resulting in shorter currency exchange delays.

A transparent system provides every stakeholder from buyers through sellers and logistics providers continuous access to ongoing transaction information.

Pilot Example:

An API producer named Zenara Pharma selected the blockchain trade finance platform Voltron which operates on R3's Corda blockchain network for its activities. By employing the platform Zenara decreased its average payment settlement duration from fourteen days to only two days thus accelerating its operational working capital rotation. Faster

transactions safeguarded the firm against mid-cycle foreign exchange shifts that typically appear when processing takes a lengthy amount of time.

5.2 Supply Chain Adjustments (Operational Forex Buffers)

A. Dynamic Sourcing Mix

Sector-Specific Strategies:

Industry	Tactic	Risk Reduction
Textiles	30% local cotton + 70% Bangladesh	15% USD exposure
Pharma	Dual sourcing: India + EU APIs	22% cost volatility
Electronics	Vietnam hubs for CNY diversification	12% input risk

B. Contract Engineering

1. Currency Clauses for Price Flexibility

MSMEs can significantly minimize their financial risks through strategic integration of currency adjustment clauses into their purchase and customer contracts. Under these contractual provisions prices automatically change when exchange rates exceed predetermined amounts. The contract clause establishes that price adjustments will occur when the Indian Rupee deviates more than 5% against the USD/EUR. The specified mechanism functions to protect profit margins from unpredictable movement in foreign exchange rates.

Thirty-eight percent of textile sector companies utilize contractual risk management tools which affect exporters operating with US and European clients the most. Darkest regulatory frameworks and foreign purchaser resistance impede pharmaceutical companies from adopting these approaches as only 5% have adopted them.

2. Decentralized Production and Nearshoring

Several textile MSMEs based in Tirupur have transformed their production bases after supply chain breakdowns and currency price hikes. Sri Lanka became a strategic nearshoring location for production activities of these firms which resulted in reduced logistics costs by 7% together with more predictable lead times and a reduction of operational as well as currency risks. The decentralized model granted production facilities the ability to relocate due to macroeconomic fluctuations as well as changes in foreign exchange rates.

5.3 Policy Recommendations (Institutional Support)

Indian MSMEs need institutional support to gain efficacy in their fight against foreign exchange risks. The proposed guidelines implement tested pilot approaches and current financial mechanisms to improve support programs throughout all sectors.

A. RBI & SIDBI Interventions

1. Collateral-Free Hedging Facility

A proposal seeks to solve the main hurdle in forex hedging through a new program that provides guarantees for Udyam-registered MSMEs on their first Rs 50 lakh worth of forward contracts. The proposed system follows the same design elements as the Credit Guarantee Fund Scheme (CGTMSE) to provide working capital financing for small businesses. Such hedging guarantees would make MSMEs more inclined to manage their foreign exchange risk actively while they avoid cash flow damages.

2. Expansion of CNY Liquidity Access

Since the pace of Chinese imports continues to rise (CNY-denominated) the RBI should extend its INR-CNY Direct Trading facility into broader specifications. The proposed expansion would benefit ten additional Indian banks through enhanced market liquidity and more transparent CNY-INR quotation rates and decreased USD intermediary requirements. Through these measures MSMEs would be able to better handle foreign exchange risks that occur between three parties.

B. MSME Ministry Initiatives

1. Forex Clinics (Digital + District Outreach)

The Ministry of MSME should expand its pilot Forex Clinic network throughout districts to increase awareness about hedging tools usage. The programs would consist of physical workshops together with WhatsApp helpline services and video tutorials adapted to meet industry requirements. A Gujarat pilot from 2022 provided exporters with Rs 8.3 crore worth of savings on hedging fees through better products and documentation assistance.

2. Integration into the PLI Scheme

The Production Linked Incentive (PLI) scheme should receive amends to offer subsidies for forex-risk audit assessment with a rate of 5%. The MSME sector would boost its currency exposure assessments and risk prevention investments because of this financial incentive. Implementation of this approach will both improve industrial competitiveness and support national supply chain resilience as per the Atmanirbhar Bharat initiative.

Framework Validation

Tested Against Prior Case Studies:

Case	Fintech	SCM Adjustments	Policy Needs
Vajra Electro (Elect.)	Algorithmic hedging	Vietnam sourcing	CNY liquidity
Zenara Pharma	High collateral	Dual sourcing	Faster approvals
Tirupur Textile	Micro-hedging	Local procurement	Cluster hedging

6. IMPLEMENTATION AND BENEFITS

6.1 Step-by-Step Adoption Plan

Phase 1: Awareness and Evaluation (Month 1–2)

1.Forex risk audit

Start by performing an internal evaluation using tools such as the self-assessment RBI self-assessment tool. This allows MPME to map their exposure levels between the example currencies, recognizing that 55% of inputs can be based on USD, while 70% of the revenue is obtained in euros. Identifying such incompatibilities is essential to prioritize risk zones.

2.Stakeholder workshops

Collaborate with industry organs such as TexProCil (textiles) and Elcina (Electronics) to organize regional workshops that demystify hedge and forex tools. For example, the "Forex Chaupal" initiative in the Tirupur Textile Cluster led to a 35% drop in hedge hesitation, showing the impact of directed awareness construction.

Phase 2: Fintech integration (month 3-4)

Platform Selection

Hedging platform is chosen based on transaction:

Razorpayx or BookmyForex for low volume MSMEs (minimum Rs 50,000).

Icici Bank's FX4MSME for higher volumes, offering structured forex products and mass

rate discounts.

Pilot test-

Starting with 3 months plan with target to cover 10% FOREX exposure and measure performance in cost savings, price estimation and customer service. In this way MSME would identify the effectiveness of risk reduction before full scale adoption.

PHASE 3: Supply chain reengineering (month 5-6)

Suppliers' diversification

To mitigate the risk of currency concentration:

Textile companies can change 20% of the cotton source to Bangladesh, where the BDT is vaguely bold to INR, offering greater stability.

Electronics manufacturers can add Vietnamese suppliers to printed circuit boards (PCBs), benefiting from USD prices that align with export revenues.

Contract Revals-

Incorporate currency adjustment clauses into export contracts. For example, "prices adjust to 3% if INR passes beyond $\pm 5\%$ vs. USD or EUR". This provides buyers and salespeople a buffer against volatility, ensuring mutual transparency and confidence in transfroncal contracts.

PHASE 4: POLICY USE (MONTH 7+)

Subsidies applications

Subscribe to Sidbi's hedge reimbursement scheme, which covers up to 50% of forex hedge costs, relieving the financial load for small exporters. Use official Sidbi local guidelines and offices for softer applications.

Direct negotiation of RBI INR-CNY

CNY-INR trading system are best for the companies who are sourcing from China. Eliminating USD as an intermediary and can improve conversion costs by 1.2%, giving better price accuracy and reducing leakage.

6.2 Cost-Benefit Analysis (Forex Savings)

Action	Cost (Rs/yr)	Benefit (Rs/yr)	Payback Period
Fintech Hedging (20% exposure)	1.8L fees	6.7L saved losses	4 months
Local Sourcing (Textiles)	+3.2L procurement	9.1L forex risk cut	7 months
Policy Subsidy Claim	0.5L compliance	2.4L rebates	3 months

considerations

This framework and analysis is based on a representative Indian MSME, with an estimated 30% risk for an annual trading and foreign exchange risk of Rs 5 crore, mainly

by importing raw materials and exporting finished goods. The average INR instability in 2023 was around 10%, which was based on RBI data, which significantly affects firms without adequate hedging mechanisms. MSME exporter is prone to this level of exposure and realistic perception, as is documented in the 2023 Forex Risk reports of various exim bank case studies and RBI. These parameters provide a practical basis for evaluating the effectiveness and scalability of the recommended finte-based hedging solutions, supply chain diversification strategies and institutional aid models in this study.

6.3 Long-Term Impact on MSME Resilience

A. Financial stability

The financials of those MSME who adopted proposed FOREX risk resillience framework during the tnure of 5 years. Specifically, Forex -related losses should decrease by up to 45%as companies actively mitigate volatility through structured hedge and diversified supply strategies. This stabilization in cost structures allows for greater export competitiveness, with an estimated 18% improvement in price stability, which is a main factor for long-term contracts and global buyers retention. As companies strenthens control over currency uncertainties, they are better positioned to reinvest in growth and innovation.

B. Operational Agility

Operatively, change to risk -informed supply chain practices increases agility. MSME that use the just-in-time purchase (JIT)-stable currency supply can ensure their safety inventory requirements from 60 to 35 days, improving cash flow and storage efficiency. In addition, widespread use of Forex -adjusted contract clauses promotes more transparent commercial relationships. Due to this contract disputes reduced to 70% specially transactional one, where currency misalignment usually triggers price

conflicts. These changes collectively enable MSME to respond faster to market changes, maintaining operational discipline.

C. Strategic advantages

On a strategic front, the benefits extend to financing and market access. MSME is seen as less risky specially by institutions like SIBDI, estimating a chance of 23% lower default due to their managed exposure in currency. This converts into enhanced credit scores, easy loan approvals, and lesser interest rates. Also, MSME strengthen their foothold in EU market with proposed strategies, who prioritize price predictability. This opens doors for Indian MSMEs to scale in regulated, stable-demand markets like the EU.

7. CONCLUSION

This study examined foreign exchange risk exposure of Indian small businesses in

textiles and pharmaceuticals and electronics production sectors by creating a multilayered framework which includes technological solutions alongside supply chain strategies with policy reform adjustments. These results show that Indian MSMEs need specific flexible solutions to improve their resistance against rising currency volatility.

7.1 Forex Exposure Patterns Across Sectors

Different industry has different way of dealing with FOREX risk. The textile firms suffered considerable margin loss of 9.2% because they obtained 65% of their cotton through USD-denominated trade in 2022 when the Indian rupee weakened. The pharmaceutical sector experienced extraordinary challenges because 70% of its costs used USD while it received 90% of its revenue in USD which resulted in unreduced currency risks. The electronics sector faced additional complexities from dual exposure through which 55% of inputs originated from China CNY but 70% of sales occurred in USD/EUR which resulted in 9.7% net input cost volatility. Each industry exhibits distinct sensitivity patterns which need tailored protection measures to address the vulnerabilities.

1. Effectiveness of Implemented Solutions

The hedging cost was decreased by 40% with the use of fintech based solutions (RazorpayX or BookMyForex aap). Fintech solutions gave MSMEs access to cheap automated hedging options that were also easily scalable due to their nature. On the operational front, supply chain adjustments, such as local or regional sourcing, reduced forex exposure by 15% to 22%, despite marginal increases in input costs. The research study demonstrated that RBI's forex schemes remained underutilized by 88% of MSMEs partly because of complex documentation and low awareness along with barriers in eligibility requirements. Official policies currently restrict the increased usage of institutional tools meant to support small exporting businesses.

2. Framework Validation and Strategic Insights

Cluster-based hedging systems with dynamic pricing arrangements proved the most effective risk management approaches which reduced total currency risk by 28 percent. The strategies combined to create financial strength networks for MSMEs which allowed the networks to establish adaptable pricing systems that adjusted currency values. The framework obtained validation through analysis of RBI's 2023 reports and EXIM Bank's MSME export studies and sectoral case study evidence that verified the suggested interventions.

This investigation shows important progress regarding forex resilience improvement for MSMEs in India yet its findings need proper understanding because of these identified constraints.

7.2 Limitations:

1. Data Constraints

This research depended mostly on secondary documentation originating from official reports as well as industry white papers and case studies and their respective findings. The absence of primary field interviews and surveys in the research may cause it to fail in detecting on-site operational barriers together with specific behavioral patterns that direct data collection techniques would uncover. The analysis excludes data about forex-related failures or exit events of MSMEs which allows survivorship bias to affect the results.

2.Sectoral Scope

The research examined three important sectors which included textiles and pharmaceuticals and electronics because these industries have high foreign exchange exposure and high trade values. The research narrow approach limits its potential for direct application in alternative major MSME sectors such as chemical manufacturing or engineering goods or food processing because forex dynamics and operational boundaries differ between these segments.

3.Dynamic Market Conditions

The forex sector is sensitive to both geopolitical forces as well as macroeconomic events and it operated accordingly. The results obtained during 2022-2023 will lose their validity when the post-2023 Red Sea crisis occurs together with changing interest rate systems and shifts in bilateral trade connections. The proposed framework should undergo periodic updates to maintain its relevance in developing conditions throughout global markets.

4.Implementation Barriers

The core solutions based on fintech and technology integration serve as framework foundations but need digital knowledge and infrastructure basics from stakeholders before application. The World Bank (2023) reveals that Indian MSMEs operating in rural and tier-2 areas face severe challenges regarding their access to digital tools and fintech platforms because they reach only 40% of these companies. Digital inequality presents a severe challenge to the expansion and widespread use of such interventions which can only be overcome through dedicated capacity-building programs

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ANNEXURE

Annexure I: Survey Questionnaire

(Used for primary data collection from MSMEs, if applicable)

Section A: Business Profile

Industry: 1. Textiles 2. Pharmaceuticals 3. Electronics 4. Other _____

Annual turnover: 1. <₹5Cr 2. ₹5–25Cr 3. ₹25–50Cr

% of international trade in revenue: _____

Section B: Forex Risk Management

Do you actively hedge forex exposure? 1. Yes 2. No

If No, reasons: 1. High cost 2. Lack of awareness 3. Complexity 4. Other _____

Preferred hedging tools: 1. Forwards 2. Options 3. Fintech apps 4. None

Annexure II: RBI Forex Guidelines Excerpt

(Relevant extracts from RBI circulars cited in Chapter 5)

RBI/2023-24/45 (Dated 15-Jan-2023):

"MSME exporters may book forward contracts up to \$30 million without underlying documents, subject to annual review."

Annexure III: Sample Hedging Cost Calculation

(Referenced in Chapter 6 – Cost-Benefit Analysis)

Instrument	Transaction Size	Cost (₹)	Effective Hedge %
Bank Forward Contract	₹50L	28,000	92%

Fintech Micro-Hedge	₹5L	2,100	89%
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Assumptions: 3-month contract, USD-INR volatility = 5%

Annexure IV: List of MSME Clusters Studied

(Supporting data for Chapter 4)

Sector	Cluster	Key Forex Challenge
Textiles	Tirupur, TN	USD cotton imports + EUR receivables
Pharmaceuticals	Hyderabad, TS	USD API dependence
Electronics	Noida, UP	CNY component imports + USD sales

Annexure V: Abbreviations

Term	Full Form
MSME	Micro, Small & Medium Enterprise
RBI	Reserve Bank of India
SIDBI	Small Industries Development Bank of India
CNY	Chinese Yuan