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NATIONAL STEEL POLICY 2017 AND THE INDIAN STEEL SECTOR: A FINANCIAL IMPACT ANALYSIS

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ABSTRACT

This study examines the influence of the National Steel Policy 2017 on the financial performance of steel companies in India using a set of important financial ratios. The study uses paired sample t-tests on data to compare during five years before and after the regulation was implemented. The findings show that crucial financial measures such as Return on Assets, Return on Capital Employed, Earnings Per Share, Debt Service Coverage Ratio, and Debtor Turnover Ratio have all improved significantly. These findings imply that policy has had a beneficial impact on the sector's profitability, financial efficiency, and debt management. Other metrics, such as operating profit margin, net profit margin, inventory turnover ratio, creditor turnover ratio, and proprietary ratio, improved numerically but no statistical impact can be established. The analysis indicates that, while NSP 2017 had a significant influence on certain financial aspects, future policies should employ more targeted tactics to create larger, more consistent improvements throughout the industry.

Keywords: Financial, National Steel Policy 2017, Analysis

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1. INTRODUCTION

India has emerged as a global leader in steel production, ranking as the second-largest crude steel producer in the world. By 2019, India produced approximately 111.2 million tonnes (MT) of crude steel, accounting for nearly 5% of global output, surpassing Japan. In addition to its production capacity, India also holds the position of the third-largest consumer of finished steel, trailing only behind China and Japan in global consumption rankings (International Energy Agency, 2020). The steel sector holds strategic importance for India's industrialisation and is a key focus area for national development. Recognizing its role in economic growth, the Government of India (GoI) has prioritized its expansion, as reflected in the National Steel Policy (NSP) 2017, which outlines ambitious targets for scaling up crude steel production to 227 million tonnes (Mt) by 2030, 347 Mt by 2040, and 489 Mt by 2050 (National Steel Policy 2017; Hall, Spencer, & Kumar, 2020). These projections underscore the government's long-term vision of making India a global leader in steel production while aligning with sustainable and competitive manufacturing goals.

In terms of ownership structure, approximately 81% of India's steel production is contributed by private sector enterprises, while the public sector accounts for the remaining 19%. This division highlights the dominant role of private entities in driving the country's steel output. Furthermore, among the numerous producers in the country, six major steel companies account for around 64% of total national steel production, underscoring a high level of market concentration among a few large players (Annual Report, Ministry of Steel 2021).

While steel production facilities are dispersed across several Indian states, including Gujarat and Karnataka, a significant concentration is observed in the region known as the "Steel Belt", located in central and eastern India. This industrial corridor encompasses key steel-producing states such as Jharkhand, West Bengal, Odisha, and Chhattisgarh (Hall, Spencer, & Kumar, 2020). The regional clustering of steel plants can be attributed primarily to the abundant local availability of iron ore and coal, which are essential raw materials for steelmaking. However, it is important to note that the quality of these natural resources often varies, with some deposits containing lower-grade materials unsuitable for certain steel production processes (IEA, 2020). In addition to resource availability, the strategic location of major ports such as Paradip and Haldia further strengthens the region's position as a steel hub. These ports facilitate the import of critical raw materials like coking coal, which India must source from abroad, as well as the export of finished steel products to international markets (Hall et al., 2020).

Although the COVID-19 pandemic may have moderated earlier projections, the ambition to expand steel production in India continues to be seen as an indicator of the country's industrial advancement and economic growth. Also, the industry faces mounting pressure to transition towards more sustainable and energy-efficient practices, given that it is one of the largest industrial contributors to greenhouse gas emissions (Kim et al., 2022). As the global steel industry aligns itself with decarbonization goals and circular economy principles, India's role becomes increasingly influential in both meeting domestic infrastructure demands and contributing to global sustainability targets. Previously, India's steel production witnessed significant acceleration following the economic liberalisation policies of the 1990s. Since 2010, output has more than doubled, and the sector is projected to grow considerably in the coming decades, driven by expanding infrastructure and industrial demand (Samajdar, 2012; World Steel Association, 2018). Hence, assessing the financial performance of Indian steel companies in the context of NSP 2017 becomes essential to understand the policy's tangible impact on the industry's growth, profitability, and sustainability.

2. LITERATURE REVIEW

The continuous debate regarding financial performance in Indian steel industry has been in discussion as several studies have examined various aspects from **Sharma & Reddy (1985)** studying liquidity of one major steel company**, Shah and Tripathy (1993)** for growth of operational research in the Indian steel industry, **Schumacher and Sathaye (1998)** accounting and econometric estimates to evaluate productivity growth within the steel and iron sector.

After the economic policy shift, various studies have been conducted, such as **Karmakar (2008),** which emphasised the transformative influence of economic liberalisation on the Indian steel industry, driven by key reforms like price decontrol, disinvestment, and tariff reductions. These initiatives significantly increased steel production, enhanced competitiveness, and shifted India from a net importer to a net exporter. The rise of private investment, modernisation, and greenfield projects further fuelled this growth. Complementing this view, **Burange and Yamini (2008)** analysed pre- and post-liberalisation trends, noting growth in production and trade, but a decline in employment due to competitive pressures. Their competitiveness index identified Tata Steel as the overall leader, surpassing SAIL in financial efficiency despite SAIL's stronger market presence.

Before the formulation and implementation of the National Steel Policy (NSP) 2005, the Indian iron and steel industry underwent extensive scrutiny by various scholars who investigated its financial and operational dynamics through diverse analytical lenses. **Sur (2001)** carried out a comparative study on four major steel firms, finding that while inventory turnover had a positive impact on profitability, other liquidity measures adversely affected it. **Bardia (2004)** focused on SAIL, employing Motaal's comprehensive test and Spearman's rank correlation to establish a positive link between liquidity and profitability. A subsequent study in **Bardia (2006)** compared SAIL and TISCO, using time series, regression, and chi-square methods to analyze liquidity strategies and working capital trends. Expanding on this, **Bhunia (2007)** explored working capital management in SAIL and IISCO over a twelve-year period, revealing that both firms faced liquidity challenges due to inefficient inventory and receivables management—factors that underscored the importance of operational efficiency for financial stability.

Palaniappan (2009) evaluated six leading firms from 1997 to 2007, noting that TISCO outperformed others in profitability metrics, while RINL led in liquidity strength. Regression analysis demonstrated that operational efficiency contributed positively to profitability, whereas firm size and leverage had a detrimental effect. **Rohini (2004)** examined performance during economic downturns post-1995-96, identifying rising costs and obsolete infrastructure as key challenges—though TISCO remained resilient. **Bhunia and Brahma (2009)** investigated the liquidity-profitability relationship across seven private firms, concluding that inadequate liquidity and poor operational efficiency were major contributors to diminished profitability. **Srinivas (2005),** using the Taxonomic Method, assessed the overall performance of eleven firms covering over 95% of the market share and highlighted substantial growth in production, capacity, and exports. Collectively, these pre-NSP 2005 studies provided critical insights into financial inefficiencies, emphasizing the urgent need for reforms—needs that would later be addressed by India's national steel policies aimed at modernization, competitiveness, and global integration.

In the post-NSP 2005 period, researchers undertook comprehensive evaluations of the Indian steel industry's financial performance amid globalization and evolving market dynamics. **Ramaratnam and Jayaraman (2010)** assessed key financial ratios from 2005–2010, revealing the sector's struggles with overcapacity and declining demand, compounded by international anti-dumping measures. **Pal (2012)** emphasized a multidimensional relationship between profitability, liquidity, leverage, and efficiency, arguing that strong sales alone could not drive profitability—financial soundness across multiple parameters was crucial. **Popat (2012)** conducted a profitability comparison across leading firms, showing Tata Steel's superior margins, while JSW and SAIL exhibited volatile earnings. **Lavanya and Reddy (2012)** spotlighted sponge iron units—critical links in steel production—using a market value-added approach to reveal profitability constraints stemming from modernization gaps, taxation issues, and cost inefficiencies. **Golden and Parthasaarathy (2013)** focused on Tata Steel's strategic resilience during the global financial crisis, highlighting its emphasis on customer-centric operations. Similarly, **Tirkey and Osamah (2013)** confirmed Tata Steel's superior financial performance relative to Jindal Steel. **Sivakumar (2013)** pointed to high production costs and underutilized capacity as key concerns, calling for government subsidies and strategic investments in small units. **Kavitha and Palanivelu (2014)** argued that profitability hinges on controlling input costs and improving brand value. **Shukla (2015)** underscored high debt usage across firms, recommending cost control and production scaling. **Raju and Venkateshwar (2016)** found performance consistency across major firms, despite fluctuating profitability ratios. **Thenmozhi and Tamilselvi (2015)** applied Altman's Z-score, identifying JSW and Tata Steel as financially stable, while Welspun faced distress. **Patel (2016)** reported mixed liquidity and profitability outcomes for SAIL and RINL, calling for better working capital and inventory management. **Mani (2019)** identified a sector-wide decline in profitability and liquidity, with many firms facing financial stress. **Mahajan (2017)** confirmed this trend, citing increased debt levels and declining solvency, further underscoring the urgent need for strategic financial reforms post-NSP.

In the post-NSP 2017 era, the Indian steel industry witnessed renewed scholarly attention toward evaluating financial robustness, operational efficiency, and market resilience amidst global uncertainties. **Hemashree and Rajan (2022)** evaluated six steel firms and found Tata Steel leading in profitability ratios, while Mahamaya Steel excelled in liquidity and asset utilisation. **Sharma (2022)** extended this assessment to public-sector giants SAIL and RINL over two decades, concluding that while liquidity remained stable, SAIL underperformed in fixed asset management and profitability. **Garg and Gulia (2022)** reaffirmed the positive correlation between liquidity and profitability at SAIL, highlighting improved ROA and ROCE. Similarly, **Bose and Gnanaraj (2023)** applied EVA metrics to SAIL and found financial underperformance in several years, with regression models showing insignificant influence of profitability ratios on value creation. Studies also addressed the financial vulnerability of mid and small-cap steel firms. **Gandhi and Moradiya (2022)** applied the Altman Z-score and flagged Jindal Stainless, Usha Martine, and Technocraft as financially distressed. **Shukla et al. (2021)** compared top BSE-listed steel firms, identifying no significant differences across key ratios except ROCE. **Singh (2022)** noted that Tata Steel outperformed RINL in financial health, though both showed weak short-term solvency. **Das (2021)** contrasted public and private players, revealing public firms excelled in liquidity and asset management, while private firms were better at managing debt and inventories. **Chelladurai (2021) and Sharma (2022)** found inconsistent profitability and liquidity trends across firms, particularly in the COVID-19 period. **Das (2023)** reaffirmed Tata Steel's gradual recovery in ROE and NPM. **Prabhakar (2020)** reported NMDC as a standout performer in efficiency and solvency. **Lakhina and Didwania (2022)** emphasized that ROCE and OPR strongly influenced profitability, whereas working capital drivers showed mixed relevance. Collectively, these studies illustrate a sector balancing resilience and risk, navigating macroeconomic shocks, and transitioning toward financial sustainability in the post-NSP policy landscape. Also**, Singh et al. (2025**) highlight India's steel industry has grown rapidly due to rising

demand, supportive policies like NSP 2017 and the PLI scheme, and increasing infrastructure needs—despite environmental challenges and the need for sustainable production practices.

While many studies have investigated how Indian steel companies perform financially across different policy phases, some important gaps remain. Research before the 2005 National Steel Policy mostly focused on individual companies and specific financial areas, without offering a full picture of the industry. After 2005, studies became broader but often lacked long-term comparisons. The 2017 policy, which aimed to boost competitiveness and modernise infrastructure, hasn't been deeply evaluated yet. Most recent research still looks at a few companies or individual financial factors, rather than combining key aspects like liquidity, profitability, solvency, and efficiency. There's also no research comparing financial performance pre- and post-2017 policy across both public and private sector firms.

The National Steel Policy 2005 was created to support the steady growth of India's steel industry during changing global conditions. However, as **Saraswat and Bansal (2017)** members of NITI Aayog in their report highlighted, new global and local challenges called for an updated policy. These challenges included global competitions, China's dominance and disruptions in raw material supplies due to court rulings and mine closures. Indian steel companies also struggled with high costs—like expensive coal, transport, and loans—which hurt their ability to compete globally. This led to rising debt, from ₹45,160 crore in 2014 to ₹53,580 crore in 2016, with a quarter of loans becoming risky, calling the need for government help and access to long-term funding.

3. RESEARCH OBJECTIVE AND METHODOLOGY

Since the launch of NSP 2017, it's important to closely examine how steel companies are performing financially to ensure the effectiveness of the policy. The primary aim of this study is to conduct a comprehensive financial assessment of Indian steel companies within the context of evolving national policies. Adopting a quantitative research approach, the study applies ratio analysis to examine financial performance across key dimensions, including liquidity, profitability, efficiency, and solvency. The specific objectives of this study are as follows:

1) To assess the financial performance of Indian steel companies which is examined by their liquidity, profitability, efficiency, and solvency ratios.
2) To compare the financial performance of steel companies 5 years Pre and Post the National Steel Policy 2017 to understand its real impact on the industry.

4. HYPOTHESES OF THE PRESENT STUDY

Based on the earlier studies and the objective of the present study. The following hypotheses are formulated for the study:

(H_1): There is a significant change in profitability ratios (OPM, NPM, ROA, ROCE, EPS) of Indian steel companies Pre and Post the National Steel Policy 2017.

(H_2): There is a significant change in liquidity ratios (CR, QR) of Indian steel companies Pre and Post the National Steel Policy 2017.

(H_3): There is a significant change in solvency ratios (DSCR, PR) of Indian steel companies Pre and Post the National Steel Policy 2017.

(H_4): There is a significant change in efficiency ratios (ITR, DTR, CTR) of Indian steel companies Pre and Post the National Steel Policy 2017.

The present study utilises a purposive sampling technique, selecting companies listed under the Steel Index from the CMIE-Prowess database. The index consists of 58 companies, of which data of various financial performance measures have been obtained for 10 years, 48 companies were included in the final sample based on data availability, as 5 companies have been in operation after 2017 and 5 companies miss out their financial data for required years. The study spans ten years, drawing data on various financial ratios from the annual financial statements available in the Prowess Database maintained by the Centre for Monitoring Indian Economy Pvt. Ltd. (CMIE). To evaluate the impact of the National Steel Policy (NSP) 2017, which was launched on May 8, 2017, the period under review is divided into five years pre-policy period (FY 2012–13 to FY 2016–17) and five years post-policy period (FY 2018–19 to FY 2022–23)

phases, with FY 2017–18 being excluded to avoid transitional effects. The following ratios were obtained to assess the financial performance of the sample companies over a ten-year period.

Dimensions	Variable	Authors
Profitability	Operating Profit Margin (OPM) Net Profit Margin (NPM) Return on Assets (ROA) Return on Capital Employed (ROCE) Earnings Per Share (EPS)	*Patjoshi (2016); Sharma (2020)* *Pal (2018); Patjoshi (2016); Meghnath et al. (2018); Das (2023)* *Pal (2011); Garg et al (2022); Balakrishnan (2016); Bose et al. (2023); Das (2021)* *Bhunia et al. (2011); Pal (2011); Singh et al (2020); Sharma (2020); Garg et al. (2022); Lakhina et al. (2022)* *Sinku et al. (2014); Pal (2018); Meghnath et al. (2018); Reddy (2019); Bose et al. (2023);*
Liquidity	Quick Ratio(QR) Current ratio (CR)	*Sur (2001); Shukla (2015); Krishnamoorthi (2016); (Kumar S (2017); Rao (2016); Sivabagyam et al. (2019); Shukla et al. (2021)* *Sur (2001); Srinivas (2005); Bhunia et al. (2011); Shukla (2015); Sivabagyam et al. (2019); Sharma (2020); Hemashree et al. (2022)*
Solvency	Debt Service Coverage Ratio (DSCR) Proprietary Ratio (PR)	*Pal (2011); Arab et al (2014); (2015); Pal (2018); Sinku et al (2014)*
Efficiency	Inventory Turnover Ratio (ITR) Debtors Turnover Ratio (DTR) Creditors Turnover Ratio (CTR)	*Sur (2001); Bhunia (2011); Pal (2011); Sinku et al. (2014); Patjoshi (2016); Hemashree et al. (2022); Prabhakar (2020)* *Arab et al. (2015); Kumar S (2017); Pal (2011); Sinku et al (2014); Sivabagyam (2019)* *Bhunia (2011); Khan et al. (2011); Pal (2011); Kumar S (2017); Das (2023)*

To evaluate the study's hypotheses, a paired t-test was employed, as it is appropriate for comparing two related groups. Since the fundamental characteristics of the companies remained constant before and after the implementation of the National Steel Policy 2017, this method allowed for an effective assessment of whether any significant changes occurred in financial performance between the five-year periods before and after the policy was introduced.

5. ANALYSIS AND DISCUSSION

Table 1 Profitability Ratios Paired t-Test Results two-tailed (Pre vs Post NSP 2017)

Ratio	Mean (5 years pre and post)		Std. Dev	Std error mean	t stat	p-value
OPM	Pre	5.21	22.3657	3.2282	0.558	0.579**
	Post	3.40				
NPM	Pre	-2.88	40.3896	5.8297	1.188	0.241**
	Post	-9.81				
ROA	Pre	-1.27	8.5467	1.2336	-2.677	0.010*
	Post	2.03				
ROCE	Pre	-2.69	16.3105	2.3542	-2.193	0.033*
	Post	2.48				
EPS	Pre	1.78	35.9367	5.1870	-3.116	0.003*
	Post	17.94				

***Significant at 5%; **not Significant at 5%*

The OPM and NPM showed a decline post-NSP, but these changes were not statistically significant (p-values > 0.05), suggesting no conclusive impact. Therefore, the results do not provide sufficient evidence and we fail to reject the null hypothesis for the two ratios OPM and NPM.

In contrast, remaining ratios, like ROA, ROCE, and EPS, all showed statistically significant improvements after NSP 2017 ($p < 0.05$). Among these, EPS exhibited the most substantial increase, indicating a strong post-policy profitability effect. Hence, the null hypothesis is rejected for ROA, ROCE and EPS, suggesting that NSP 2017 had a positive impact on these aspects of profitability.

Table 2 Liquidity Ratios Paired t-Test Results (Pre vs Post NSP 2017)

Ratio	Mean (5 years pre and post)		Std. Dev	Std error mean	t stat	p-value*
Quick Ratio (QR)	Pre	0.565	2.7652	0.3991	-1.173	0.2466**
	Post	1.033				
Current Ratio (CR)	Pre	1.124	3.0231	0.4363	-1.853	0.070**
	Post	1.934				

***Significant at 5%; **not Significant at 5%*

The analysis indicates that both the QR and CR of Indian steel companies showed an upward trend after the implementation of the National Steel Policy 2017, suggesting an overall improvement in short-term liquidity positions. However, the observed changes in QR were not statistically significant ($p = 0.247$), meaning the improvement could be due to random variation.

On the other hand, the increase in CR was more pronounced and the p-value (0.070) was just slightly above the conventional 0.05 threshold, indicating a marginal level of statistical significance. The null hypothesis could not be rejected for both the ratios of liquidity, indicating that the observed improvements in liquidity post-NSP 2017 were not statistically significant at the 5% level.

Table 3 Solvency Ratios Paired t-Test Results (Pre vs Post NSP 2017)

Ratio	Mean (5 years pre and post)		Std. Dev	Std error mean	t stat	p-value
Debt Service Coverage ratio (DSCR)	Pre	0.297	3.8039	0.5491	-2.485	0.017*
	Post	1.661				
Proprietary Ratio	Pre	22.00	38.0995	5.4992	-1.901	0.064**
	Post	32.45				

**Significant at 5%; **not Significant at 5%*

There are divergent trends in post-policy financial metrics. The DSCR significantly improved after the implementation of the NSP 2017, with a mean increase of 1.36 and a p-value of 0.017, which is below the 0.05 significance threshold. The null hypothesis is rejected, indicating a statistically significant improvement in debt-servicing capacity post-NSP 2017.

Meanwhile, the PR suggests a stronger equity base relative to total assets, which typically implies reduced financial risk and improved long-term financial health. However, the t-statistic is -1.901, and the two-tailed p-value is 0.0635, which is slightly above the conventional 5% significance level. Therefore, while the data reflects a positive trend in proprietary ratio post-NSP, the change is not statistically significant. So, null hypothesis could not be rejected, suggesting that the observed change lacks statistical significance."

Table 4 Efficiency Ratios Paired t-Test Results (Pre vs Post NSP 2017)

Ratio	Mean (5 years pre and post)	Std. Dev	Std error mean	t stat	p-value*

Inventory Turnover Ratio (ITR)	Pre	23.41	117.2336	16.9212	-1.419	0.163**
	Post	47.42				
Debtor Turnover Ratio (DTR)	Pre	13.64	16.7054	2.4112	-2.571	0.0134*
	Post	19.84				
Creditor Turnover Ratio (CTR)	Pre	18.61	83.7963	12.0949	-1.323	0.1923**
	Post	34.61				

***Significant at 5%; **not Significant at 5%*

The analysis of turnover ratios reveals mixed outcomes. The ITR showed a substantial numerical increase, suggesting that companies were able to convert their inventory into sales more efficiently. However, this improvement was not statistically significant (p = 0.163), mainly due to extreme variability and outliers, which made the average less reliable. Similarly, the Creditor Turnover Ratio (CTR) also increased, implying that companies were paying off creditors early after NSP 2017. However, the result was not statistically significant (p = 0.1923), and like ITR, CTR was also affected by high variability and extreme outliers. Thus, we fail to reject the null hypothesis for both ITR and CTR.

In contrast, the Debtor Turnover Ratio (DTR) showed a statistically significant increase from 13.64 to 19.84 (p = 0.0134). This indicates that firms, on average, collected receivables more quickly post-NSP, pointing to better cash flow and credit management. Thus, the null hypothesis for DTR has been rejected.

6. SUMMARY

This study reveals that the impact of the NSP 2017 on the Indian steel industry's financial performance has been mixed and nuanced. While improvements were seen in certain areas, it's important to understand that some financial indicators offer deeper insights than others. For instance, Return on Assets (ROA) is a key measure that shows how efficiently a company uses its total assets to generate profit. If a company's income is higher than its costs, the ROA reflects this positively (Firer & Williams, 2003). Similarly, Return on Capital Employed (ROCE) helps evaluate how well a company is using its capital to produce profits. It essentially tells us how effectively management is putting the company's funds to work (Egungwu, 2005). Earnings Per Share (EPS), on the other hand, represents the amount of profit earned per share owned by shareholders. A higher EPS means that investors are getting more return for each share they hold, which usually indicates strong financial health. In fact, EPS is often used as a direct reflection of a company's profitability and ability to reward its investors (Deng et al., 2017; Constantinou et al., 2017). These three indicators—ROA, ROCE, and EPS—collectively give a clearer picture of how a company is performing financially. Gains in Return on Assets (ROA), Return on Capital Employed (ROCE), and Earnings Per Share (EPS) further show improved asset use and returns for shareholders, aligning with NSP 2017's goals of boosting long-term sectoral profitability. Thus, for profitability, as the results suggest, it is clear to say that policy has an effective and positive impact on the steel companies.

Also, Debt Service Coverage Ratio (DSCR) the company's ability to meet its obligations in the form of principal and interest expense to creditors, can be calculated using this ratio is very useful for company management to find out financial flexibility and decision making (Sambasivan 2017; Hermawan et. a. 2020). The findings suggest a positive financial trajectory, by improving debt management and liquidity, as reflected by DSCR. However, its impact on capital structure (equity proportion), while positive in trend, is not statistically uniform across the industry. This suggests that firm-level differences played a crucial role in how companies responded to the policy, and the benefits were not evenly distributed.

Debtor Turnover Ratio (DTR) improved significantly, suggesting that many companies became better at managing debt and collecting payments, signs of stronger liquidity and operational discipline. All three turnover ratios improved numerically post-policy, only the DTR showed a statistically significant and reliable improvement, suggesting that NSP 2017 positively influenced receivables efficiency, while its impact on inventory and creditor management may have been less consistent across the industry.

7. CONCLUSION

The purpose of this study was to assess the financial performance of Indian steel industry with respect to NSP 2017 by assessing important financial ratios during five years before and after the policy's implementation. Using paired sample t-tests on data from 48 companies, the study discovered statistically significant improvements in a key performance indicator, including ROA, ROCE, EPS, DSCR, and DTR. These changes show that the policy had a beneficial impact on the steel company's financial stability, profitability, and liquidity.

Other indicators, such as OPM, NPM, ITR, CTR, and Proprietary Ratio, showed numerical improvements after the policy but were not statistically significant, indicating that the policy's impact was not felt uniformly in all financial dimensions. Overall, the findings indicate that, while NSP 2017 improved certain areas of financial performance in the steel sector, its impact varied by metric and may have been mitigated by firm-level or external factors. Future policy efforts may benefit from more targeted interventions to address areas where results were inconsistent. Large variations and extreme values in the data suggest that only some firms saw real benefit, while others lagged—perhaps due to differences in size, location, ownership, or tech adoption. External shocks like COVID-19, global price swings, and policy changes may also have shaped the outcomes. To build on NSP's momentum, policymakers must promote tech-driven efficiency, better inventory practices, and tailored firm-level support. Future research should explore this further using advanced models and broader metrics, including sustainability, innovation, and export readiness.

CONFLICT OF INTERESTS

None.

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