sdmimd
JOURNAL OF MANAGEMENT

DOI:10.18311/sdmimd/2026/56498

Measuring Managerial Efficiency in Emerging Markets: Evidence from Indian Listed Firms

Savanam Chandra Sekhar

KL Business School, Koneru Lakshmaiah Education Foundation, KL University, Vaddeswaram - 522302, Guntur, Andhra Pradesh, India

Abstract

This study examines managerial efficiency among Indian listed non-financial firms and investigates the organisational and market factors associated with efficiency differences. Using panel data for 485 firms covering 2015–2022, the study employs Stochastic Frontier Analysis (SFA) to estimate firm-level managerial efficiency and identify its determinants. A Cobb-Douglas production frontier is specified using labour, capital, and material inputs, while inefficiency is modelled as a function of firm size, foreign ownership, board independence, and market concentration. By integrating efficiency measurement with corporate governance and market-structure perspectives, the study provides empirical evidence on managerial efficiency in the Indian corporate sector and offers implications for managers, investors, and policymakers.

Major Findings: The results indicate an average managerial efficiency score of 0.71, suggesting that firms operate at approximately 71% of their estimated productive potential, while approximately 76% of unexplained output variation is attributable to inefficiency. Larger firms, greater foreign ownership, and stronger board independence are associated with lower inefficiency, whereas higher market concentration is associated with increased inefficiency. Efficiency varies substantially across industries, with pharmaceuticals and information technology demonstrating relatively higher efficiency than traditional sectors such as textiles and metals. Managerial efficiency generally improved during 2015–2022, despite a temporary decline during the COVID-19 disruption in 2020. These findings highlight the importance of organisational scale, governance quality, foreign participation, and competitive market conditions in enhancing managerial productivity and competitiveness.

Keywords: Corporate Governance, Foreign Ownership, Managerial Efficiency, Market Competition, Stochastic Frontier Analysis

1. Introduction

Differences in firm performance are frequently attributed to variations in resources, technology, market conditions, and strategic positioning. However, firms operating under similar economic and competitive environments often exhibit markedly different performance outcomes. Such disparities suggest that managerial capability plays a critical role in determining how effectively organizational resources are transformed into productive outputs and competitive advantages (Bloom & Van Reenen, 2007; Demerjian *et al.*, 2012).

Traditional measures of firm performance, including profitability, return on assets, and revenue growth, provide useful insights into organizational outcomes. Nevertheless, these indicators do not explicitly separate managerial effectiveness from external influences. Market fluctuations, industry-specific shocks, regulatory changes, and macroeconomic conditions can substantially affect firm performance, making it difficult to determine whether observed outcomes are attributable to managerial actions or environmental factors (Bertrand & Schoar, 2003). Consequently, superior financial performance may not necessarily reflect effective management, while firms with capable

*Email: savanam.sekhar@gmail.com

managers may experience weaker outcomes because of adverse external conditions.

Efficiency-based approaches offer an alternative framework for evaluating managerial performance by comparing actual outcomes with an attainable benchmark. Among the available methods, Stochastic Frontier Analysis (SFA) has become one of the most widely used techniques because it distinguishes inefficiency from random statistical disturbances (Aigner *et al.*, 1977; Kumbhakar & Lovell, 2000). Unlike conventional regression models, which treat unexplained variation entirely as error, SFA decomposes deviations from the production frontier into inefficiency and random noise components. This feature enables researchers to estimate the extent to which firms fall short of their potential output and provides a more direct assessment of managerial effectiveness.

Managerial efficiency is shaped not only by individual managerial capabilities but also by broader organizational and institutional factors. Corporate governance mechanisms, ownership structures, and competitive market environments influence managerial incentives, monitoring intensity, and decision-making processes (Jensen & Meckling, 1976; Shleifer & Vishny, 1997). Effective governance systems can reduce agency problems and improve accountability, while competitive pressure often encourages firms to utilise resources more efficiently. Consequently, managerial performance should be viewed as the outcome of interactions between managerial actions and the institutional environment within which firms operate.

The Indian corporate sector provides an important context for examining these relationships. Over the past decade, Indian firms have experienced significant changes in governance regulations, disclosure requirements, foreign investment participation, and market competition. Reforms introduced through the Companies Act, 2013, and strengthened corporate governance requirements by the Securities and Exchange Board of India (SEBI) have increased emphasis on transparency, board effectiveness, and shareholder protection. Despite these developments, substantial differences in firm performance continue to exist across industries and organizations, raising important questions regarding the role of managerial efficiency in explaining such variation.

Although previous studies have examined productivity, profitability, and corporate performance in India, relatively limited evidence is available on managerial efficiency using frontier-based approaches. Existing research has frequently focused on individual industries, short time horizons, or aggregate productivity measures, providing only a partial understanding of efficiency differences across firms. A comprehensive examination of managerial efficiency across a broad sample of Indian listed companies remains limited, particularly in the context of recent governance and market developments (Coelli *et al.*, 2005).

Against this backdrop, the present study investigates managerial efficiency among Indian listed non-financial firms during the period 2015-2022 using a stochastic frontier framework. The study estimates firm-level efficiency scores and examines the influence of firm size, foreign ownership, board independence, and market concentration on managerial inefficiency.

Specifically, the study seeks to determine the extent to which Indian listed firms operate efficiently relative to their estimated production frontier, assess variations in managerial efficiency across firms and industries, examine the influence of governance and ownership characteristics on efficiency outcomes, and analyse the evolution of managerial efficiency over the study period. By addressing these issues, the research aims to provide a deeper understanding of the determinants and dynamics of managerial efficiency within the Indian corporate sector.

The study contributes to the literature in two important ways. First, it provides recent empirical evidence on managerial efficiency using a large panel of Indian listed firms covering a period characterised by significant economic and institutional change. Second, it integrates governance and market-structure variables directly into the inefficiency framework, offering

insights into how organizational and competitive factors jointly influence managerial performance. The findings are expected to contribute to the growing literature on corporate governance, efficiency analysis, and firm performance in emerging economies.

2. Literature Review

2.1 Managerial Efficiency and Firm Performance

Explaining why firms with comparable resources achieve different levels of performance has remained a fundamental question in economics, strategic management, and organisational research. Traditional measures such as profitability, return on assets, market valuation, and sales growth provide useful indicators of organisational outcomes; however, they often fail to isolate the specific contribution of managerial actions from external environmental influences (Bertrand & Schoar, 2003; Demerjian *et al.*, 2012). Firm performance is shaped by numerous factors, including market demand, technological change, regulatory developments, and macroeconomic conditions, making it difficult to determine whether observed outcomes reflect managerial competence or favourable circumstances.

Consequently, increasing attention has been directed toward managerial efficiency as a more direct measure of managerial effectiveness. Managerial efficiency refers to the ability of managers to utilise available resources in a manner that maximises output while minimising waste and inefficiency (Bloom & Van Reenen, 2007; Demerjian *et al.*, 2012). From this perspective, performance is evaluated not merely by the outcomes achieved but by the efficiency with which organisational resources are transformed into productive results. Empirical studies conducted across developed and emerging economies have consistently shown that firms operating under similar technological and market conditions often exhibit substantial differences in efficiency levels, highlighting the importance of managerial capabilities, organisational practices, and decision-making quality (Bloom *et al.*, 2012; Bhutta *et al.*, 2021; Dasgupta & Dhochak, 2022).

The efficiency perspective offers a significant advantage because it shifts the focus from absolute performance levels to relative performance against an attainable benchmark. This approach enables researchers to evaluate how effectively firms utilise their resources compared with best-practice organisations operating under similar conditions (Farrell, 1957). As a result, managerial efficiency has become an increasingly important construct for understanding persistent differences in firm performance.

2.2 Stochastic Frontier Analysis in Efficiency Research

The measurement of efficiency has evolved considerably since the pioneering work of Farrell (1957), leading to the development of several frontier-based approaches. Among these, Stochastic Frontier Analysis (SFA) has emerged as one of the most widely applied methodologies because it explicitly distinguishes inefficiency from random disturbances (Aigner *et al.*, 1977; Meeusen & van den Broeck, 1977). Conventional regression models attribute all unexplained variation to a single error term, making it difficult to determine whether deviations from expected performance result from inefficiency or uncontrollable external factors. SFA addresses this limitation by decomposing the residual into a random-error component and a non-negative inefficiency component.

The methodological capabilities of SFA expanded considerably during the 1990s with the introduction of panel-data frontier models. A particularly important contribution was made by Battese and Coelli (1995), who proposed a one-stage estimation framework that simultaneously estimates the production frontier and the determinants of inefficiency using maximum likelihood estimation (Coelli, 1995; Kumbhakar & Lovell, 2000). This approach represented a significant improvement over earlier two-stage procedures because it eliminated statistical inconsistencies arising from the assumption that inefficiency estimates were independent of explanatory variables. By modelling inefficiency directly as a function of firm-specific characteristics, such as governance quality, ownership structure, technological capability, or market conditions, the Battese and Coelli model enabled researchers to move beyond merely estimating

efficiency scores towards explaining why firms differ in efficiency. Owing to its statistical consistency and analytical flexibility, this specification has become one of the most widely adopted stochastic frontier models in empirical management and economics research (Greene, 2008; Minviel *et al.*, 2022).

Subsequent methodological developments further enhanced the versatility of stochastic frontier models. Researchers introduced alternative functional forms, including the Translog production function, to capture more flexible substitution relationships among production inputs, while Greene (2005, 2008) extended stochastic frontier estimation by incorporating firm-specific heterogeneity through true fixed-effects and true random-effects models. These advances addressed concerns that unobserved firm characteristics might otherwise be confounded with inefficiency estimates. More recent developments have integrated Bayesian estimation techniques, latent-class frontier models, dynamic stochastic frontiers, and persistent-versus-transient inefficiency decompositions, enabling researchers to distinguish structural inefficiency from temporary operational inefficiencies and to examine how efficiency evolves over time (Greene, 2008; Minviel *et al.*, 2022). Collectively, these methodological innovations have substantially improved the reliability and interpretability of efficiency estimation in longitudinal datasets.

A growing body of empirical research employing frontier methods reports substantial efficiency differences among firms operating within the same industries and using similar technologies (Atika *et al.*, 2022; Greene, 2008). Such findings suggest that organisational and managerial factors remain important determinants of performance even after controlling for resource endowments and production conditions. Accordingly, frontier-based methods have become valuable tools for assessing managerial effectiveness and identifying sources of organisational underperformance.

An important advantage of modern stochastic frontier models is their ability to incorporate explanatory variables directly into the inefficiency function. This feature enables researchers not only to estimate efficiency scores but also to examine the governance, ownership, and market characteristics associated with variations in managerial efficiency (Battese & Coelli, 1995).

2.3 Corporate Governance and Managerial Efficiency

The theoretical relationship between corporate governance and managerial performance is rooted primarily in agency theory, which argues that governance mechanisms are necessary to align managerial interests with those of shareholders and reduce agency costs arising from the separation of ownership and control (Jensen & Meckling, 1976; Fama & Jensen, 1983). Effective governance structures are expected to improve monitoring, enhance accountability, and encourage efficient resource allocation.

Ownership structure represents one of the most extensively examined governance mechanisms. In particular, foreign ownership has attracted significant attention because foreign investors often possess stronger monitoring capabilities, demand higher levels of transparency, and facilitate the transfer of managerial knowledge and best practices (Shleifer & Vishny, 1997). Empirical studies generally report positive associations between foreign ownership and firm performance, suggesting that foreign investors contribute not only financial resources but also governance discipline and managerial expertise (Zamzamin *et al.*, 2021).

Board structure constitutes another important governance mechanism influencing managerial behaviour. Independent directors are expected to provide objective oversight, reduce managerial opportunism, and strengthen strategic decision-making processes (Fama & Jensen, 1983). Empirical evidence frequently suggests that greater board independence is associated with improved firm performance, operational efficiency, and corporate accountability (Hossain, 2021; Bhagat & Bolton, 2008). Nevertheless, the effectiveness of independent directors may depend on institutional contexts, regulatory environments, and the actual quality of board functioning rather than formal compliance alone.

Despite extensive research on ownership and governance, relatively few studies have examined their joint influence on managerial efficiency using frontier-based approaches. This limitation is noteworthy because governance mechanisms often interact in shaping managerial incentives and organisational outcomes. A more integrated framework may therefore provide a deeper understanding of the determinants of managerial efficiency.

2.4 Market Competition and Efficiency Outcomes

Competition has long been regarded as an important external mechanism that disciplines managerial behaviour and promotes organisational efficiency. Theoretical arguments suggest that firms operating in competitive markets face stronger incentives to control costs, improve productivity, and innovate in response to market pressures (Nickell, 1996). In contrast, firms enjoying greater market power may experience reduced incentives to pursue efficiency improvements, allowing managerial slack and organisational inefficiencies to persist.

Market competition is commonly measured using concentration indicators such as the Herfindahl-Hirschman Index (HHI). A substantial body of empirical research reports a negative relationship between market concentration and efficiency, implying that competitive pressure encourages more effective resource utilisation and stronger managerial discipline (Salehi *et al.*, 2020; Syverson, 2011).

However, the relationship between competition and efficiency is not always linear. While moderate competition may stimulate innovation and operational improvements, excessive competition can reduce profitability and discourage long-term investments (Aghion *et al.*, 2005). Consequently, the impact of market structure on managerial efficiency reflects a complex interaction among incentives, strategic behaviour, and organisational adaptation.

In emerging economies, where governance quality often varies considerably across firms, competition may serve as an important complementary mechanism for constraining managerial inefficiency. This perspective underscores the importance of examining governance structures and market forces simultaneously when evaluating managerial performance.

2.5 Evidence from Emerging Economies and India

Research conducted in emerging economies generally reveals substantial variation in firm-level efficiency despite improvements in infrastructure, market liberalisation, and governance reforms. Although economic modernisation has enhanced productivity in many sectors, considerable differences in organisational performance continue to exist, indicating that managerial capabilities remain an important source of competitive advantage (Bloom *et al.*, 2012).

The Indian corporate sector reflects many of these broader trends. Studies have documented significant heterogeneity in firm performance across industries, ownership structures, and organisational characteristics (Yadav *et al.*, 2020; Dasgupta & Dhochak, 2022). However, much of the available literature focuses on productivity growth, financial performance, or operational outcomes rather than managerial efficiency specifically. As a result, the extent to which performance differences reflect variations in managerial effectiveness remains insufficiently understood.

Another limitation of the Indian literature is the predominance of sector-specific analyses and relatively short study periods. While such studies provide valuable insights into particular industries, they offer limited evidence regarding broader efficiency patterns across the corporate sector. Given the significant governance reforms, increased foreign investment participation, and changing competitive dynamics observed in India during the past decade, updated evidence on managerial efficiency remains necessary.

2.6 Research Gap and Conceptual Framework

The review of prior literature identifies several important gaps. First, recent evidence on managerial efficiency among Indian listed firms remains limited, particularly in the period following major corporate governance reforms and increased global integration.

Second, ownership structure, governance quality, and market competition are frequently examined in isolation despite theoretical arguments suggesting that these factors jointly influence managerial behaviour and organisational outcomes. Third, limited attention has been devoted to understanding how managerial efficiency evolved during a period encompassing both economic expansion and the disruptions associated with the COVID-19 pandemic.

To address these gaps, the present study employs a stochastic frontier framework to estimate managerial efficiency for a large panel of Indian listed non-financial firms covering the period 2015-2022. Unlike many previous studies, the analysis models inefficiency explicitly as a function of firm size, foreign ownership, board independence, and market concentration. By integrating governance and market-structure variables within a unified efficiency framework, the study provides a more comprehensive understanding of the organisational and institutional factors that influence managerial performance in the Indian corporate sector.

3. Methodology

3.1 Research Approach

The study adopts a quantitative research design to evaluate managerial efficiency among Indian listed non-financial firms. Since the objective is to distinguish managerial inefficiency from random operational disturbances, a Stochastic Frontier Analysis (SFA) framework is employed. Compared with conventional production-function models, SFA offers a more appropriate approach because it recognises that deviations from potential output may arise from both inefficiency and factors beyond managerial control.

The analysis covers the period 2015-2022, a phase characterised by governance reforms, increased foreign investor participation, changing competitive dynamics, and the economic disruption associated with the COVID-19 pandemic. Examining this period provides an opportunity to assess managerial efficiency under varying institutional and economic conditions.

3.2 Data and Sample Selection

Firm-level data were obtained from the CMIE Prowess database, which provides comprehensive information on financial performance, ownership characteristics, and governance attributes of Indian companies. The database is widely used in empirical corporate research because of its consistency and coverage of listed firms.

The initial dataset included all listed firms available during the study period. Financial institutions were excluded because their operational structure, output generation process, and balance-sheet composition differ substantially from those of non-financial firms. Firms with incomplete observations relating to output, production inputs, ownership, or governance variables were also removed.

After applying these screening criteria, the final dataset consisted of a balanced panel of 485 firms observed over eight years, generating 4,850 firm-year observations. Table 1 summarises the sample selection process.

3.3 Stochastic Frontier Specification

Managerial efficiency was estimated using a stochastic production frontier based on the Cobb-Douglas functional form. This specification was selected because of its simplicity, ease of interpretation, and widespread application in efficiency studies. The primary objective of the study is not to examine complex substitution relationships among inputs but to obtain reliable estimates of firm-level efficiency (Gbigbi, 2020).

The production frontier is specified as:

Table 1. Sample selection

Criterion	Firms
Initial listed non-financial firms	742
Financial firms excluded	(132)
Firms with missing or inconsistent data	(125)
Final balanced panel sample	485
Time period	2015-2022
Total firm-year observations	4,850

Notes: Financial firms are excluded because of their distinct production structure. Firms with incomplete information on output or key inputs are removed to ensure consistent frontier estimation.

$$Y_{it} = \beta_0 + \beta_1 \ln L_{it} + \beta_2 \ln K_{it} + \beta_3 \ln M_{it} + v_{it} - u_{it} \quad (1)$$

where:
Y_{it} denotes firm output, measured as gross sales;
L_{it} represents labour input;
K_{it} denotes capital input;
M_{it} denotes intermediate inputs.
A= technology/productivity parameter;

The error structure follows the conventional stochastic frontier framework. The term captures random shocks, measurement errors, and other influences beyond managerial control and is assumed to follow a normal distribution. The non-negative term represents managerial inefficiency and reflects the extent to which a firm operates below the estimated production frontier.

Firms exhibiting lower values of are interpreted as operating more efficiently relative to their peers.

3.4 Determinants of Managerial Inefficiency

Beyond estimating efficiency levels, the study investigates factors associated with variations in managerial efficiency. Following the inefficiency-effects approach, the inefficiency component is modelled as a function of firm-specific governance and market characteristics.

Following Battese and Coelli (1995), inefficiency effects are estimated simultaneously with the production frontier rather than using a two-stage procedure because simultaneous estimation avoids inconsistency arising from independence assumptions and produces statistically efficient parameter estimates.

The inefficiency equation is specified as:

$$u_{it} = \delta_0 + \delta_1 SIZE_{it} + \delta_2 OWN_{it} + \delta_3 GOV_{it} + \delta_4 COMP_{it} + W_{it} \quad (2)$$

where:
$SIZE_{it}$= natural logarithm of total assets;
OWN_{it}= percentage of foreign shareholding;
GOV_{it} = proportion of independent directors on the board;
$COMP_{it}$ = industry concentration measured by the Herfindahl–Hirschman Index (HHI).

Negative coefficients indicate lower managerial inefficiency and therefore higher efficiency, whereas positive coefficients suggest weaker managerial performance.

The selected variables reflect both internal governance mechanisms and external market conditions that may influence managerial behaviour and resource allocation decisions.

3.5 Estimation Technique

The production frontier and inefficiency equations were estimated simultaneously using Maximum Likelihood Estimation (MLE). Simultaneous estimation is preferred because it produces more efficient and statistically consistent parameter estimates than two-stage approaches.

Once the model parameters were obtained, firm-level efficiency scores were derived from the estimated inefficiency term using:

$$Efficiency_{it} = \exp(-u_{it}) \quad (3)$$

The resulting scores range between zero and one. Values closer to one indicate that a firm's actual performance is nearer to the estimated frontier and therefore reflects higher managerial efficiency.

3.6 Variable Measurement

The study employs variables commonly used in efficiency and governance research. Sales revenue serves as the measure of output, while labour, capital, and intermediate inputs represent the primary production factors included in the frontier model.

Firm size is measured using the natural logarithm of total assets. Foreign ownership is calculated as the percentage of equity held by foreign investors. Board independence is measured as the proportion of independent directors relative to total board size. Market concentration is captured using the Herfindahl-Hirschman Index at the industry level.

To ensure comparability across years, all monetary variables were adjusted using the wholesale price

index. Furthermore, output and production inputs were transformed into logarithmic form to reduce scale-related distortions and facilitate elasticity interpretation. Table 2 presents the variable definitions and measurement of the study.

3.7 Model Validation and Robustness Assessment

Several diagnostic procedures were employed to evaluate the suitability of the estimated frontier model. First, the statistical significance of the variance parameter was examined to confirm the existence of measurable deviations from the frontier. Second, the gamma parameter was assessed to determine the proportion of total variation attributable to inefficiency.

Likelihood ratio tests were also performed to compare the stochastic frontier specification with a conventional production-function model. In addition, the distribution of efficiency scores was inspected to ensure that the estimates were economically meaningful and not driven by outliers.

Finally, year-wise efficiency trends were analysed to assess whether the estimated patterns were consistent with major economic events and institutional developments observed during the study period.

3.8 Conceptual Framework

The analytical framework underlying the study is presented in Figure 1. The framework assumes that managerial efficiency acts as an intermediate organisational outcome linking governance conditions and market structure to firm performance.

Firm size, foreign ownership, board independence, and market competition influence managerial incentives, monitoring intensity, and decision quality. These factors, in turn, affect the extent to which firms operate below their potential production frontier. Consequently, managerial efficiency serves as the mechanism through which organisational and market conditions translate into differences in firm performance.

This framework provides the theoretical foundation for the empirical model and supports the integration of governance and competitive variables within the stochastic frontier approach.

3.9 Hypotheses

H1: Managerial inefficiency significantly explains firm-level performance differences among Indian listed firms.

H2: Larger firms exhibit lower managerial inefficiency.

H3: Foreign ownership reduces managerial inefficiency.

H4: Greater board independence improves managerial efficiency.

H5: Market concentration increases managerial inefficiency.

Table 2. Variable definition and measurement

Category	Variable	Prowess item	Measurement
Output	Gross Output	Sales	₹ million
Labour	Labour Input	Number of Employees	Count
Capital	Capital Stock	Net Fixed Assets	₹ million
Materials	Intermediate Inputs	Raw Materials + Power & Fuel Expenses	₹ million
Firm Size	SIZE	Total Assets	Natural logarithm
Ownership Structure	OWN	Foreign Shareholding	Percentage (%)
Corporate Governance	GOV	Independent Directors / Total Board Size	Ratio
Market Competition	COMP	Industry-level Herfindahl-Hirschman Index (HHI)	Index (0-1)
Managerial Performance	Efficiency Score	Estimated from SFA	Continuous (0-1)

Notes: Monetary variables are deflated using the wholesale price index. Output and production inputs enter the frontier in logarithmic form. Efficiency scores are derived from the estimated stochastic frontier.

4. Results

4.1 Descriptive Statistics

Table 3 presents descriptive statistics for the variables included in the production frontier and inefficiency models. The sample exhibits considerable heterogeneity across firms, reflecting differences in production scale, resource utilisation, ownership structures, and governance arrangements. Such variation is expected in a multi-industry panel and provides a suitable basis for examining managerial efficiency.

Firm size differs substantially across the sample. Average annual sales amount to ₹8,452.36 million, although the large standard deviation indicates that firms range from relatively small enterprises to major listed corporations. Similar patterns are observed for labour, fixed assets, and material costs, suggesting substantial differences in operational scale and production intensity.

Ownership and governance variables also display meaningful variation. Foreign shareholding ranges from zero to nearly 90 per cent, while board independence varies considerably across firms. These differences are important because they create the institutional diversity necessary to examine how governance mechanisms influence managerial performance.

The estimated managerial efficiency score averages 0.71, implying that firms, on average, achieve approximately 71 per cent of their potential frontier output. The observed range of 0.32 to 0.96 indicates that some firms operate close to best-practice performance whereas others experience substantial efficiency losses. The dispersion in efficiency scores provides preliminary evidence that managerial performance differs significantly across firms and warrants further investigation.

4.2 Stochastic Frontier Estimates

The estimated Cobb-Douglas stochastic production frontier is reported in Table 4. All input coefficients are positive and statistically significant at the 1 per cent level, confirming that labour, capital, and materials contribute positively to output generation.

Among the production inputs, materials exert the strongest influence on output, with an elasticity of 0.421. Labour and capital follow with elasticities of 0.312 and 0.274, respectively. The relative importance of material inputs is consistent with the structure of many Indian manufacturing and industrial firms, where intermediate inputs account for a substantial portion of production costs.

The estimated variance parameter is statistically significant, confirming the presence of measurable deviations from the production frontier. More importantly, the gamma parameter = 0.763 indicates that approximately 76 per cent of the unexplained variation in output arises from inefficiency rather than random shocks. This finding highlights the

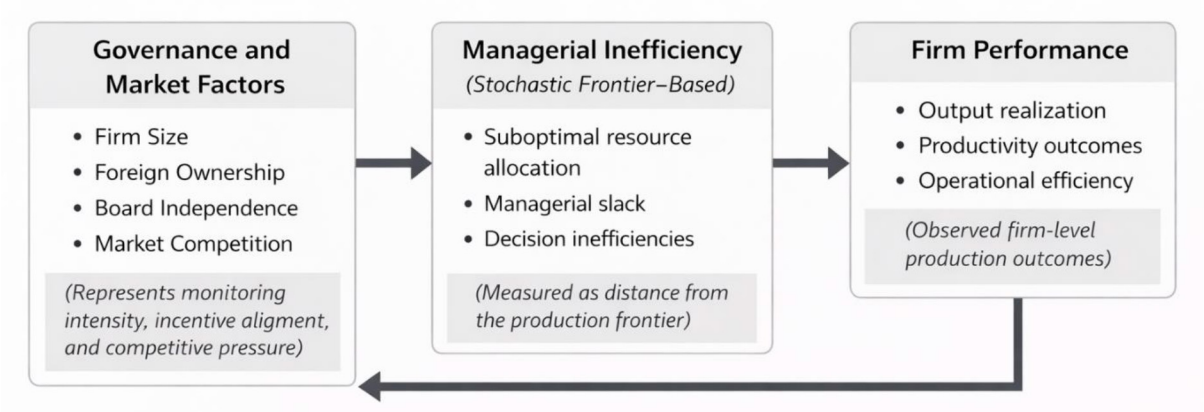


Figure 1. Theoretical framework linking governance, managerial inefficiency, and firm performance.

importance of managerial factors in explaining firm-level performance differences.

The magnitude of gamma provides strong empirical justification for the frontier approach adopted in this study. If inefficiency accounts for most of the unexplained variation, conventional regression methods that treat all residual variation as noise would overlook a substantial component of organisational performance. Accordingly, the evidence supports Hypothesis H1 and suggests that managerial inefficiency remains an important determinant of output differences among Indian firms.

4.3 Determinants of Managerial Inefficiency

Table 5 presents the inefficiency-effects estimates. The results indicate that both internal governance mechanisms and external market conditions play a significant role in shaping managerial performance.

Firm size is negatively associated with inefficiency, implying that larger firms tend to operate closer to the estimated production frontier. Larger organisations may benefit from more sophisticated managerial systems, stronger internal controls, and greater specialisation, all of which can improve resource allocation and operational discipline.

Foreign ownership also exhibits a negative and statistically significant relationship with inefficiency. Although the magnitude of the coefficient is relatively modest, the result suggests that foreign investors contribute to improved managerial performance through enhanced monitoring, governance practices, and performance expectations.

A similar pattern emerges for board independence. Firms with a higher proportion of independent directors appear to achieve greater efficiency, supporting the view that effective board oversight reduces managerial discretion and encourages more disciplined decision-making.

In contrast, market concentration is positively related to inefficiency. Firms operating in less competitive environments appear more likely to deviate from frontier performance, indicating that competitive pressure serves as an external mechanism that constrains managerial slack. Reduced competition may weaken incentives for operational improvement and efficiency enhancement.

Taken together, these findings demonstrate that managerial efficiency is influenced by both governance quality and market structure. The evidence therefore supports Hypotheses H3 and H4 and reinforces the importance of institutional and competitive factors in shaping firm performance.

4.4 Distribution of Managerial Efficiency

The distribution of firm-level efficiency scores is presented in Table 6 and illustrated in Figure 2. The results reveal considerable variation across firms rather than a concentration around a single efficiency level.

The largest group of firms, representing approximately 41 per cent of the sample, records efficiency scores between 0.65 and 0.80. A further 26 per cent fall within the 0.50-0.65 range, while 22.5 per cent achieve scores

Table 3. Descriptive statistics

Variable	Mean	Std. dev.	Min	Max
Sales (₹ million)	8,452.36	14,210.55	112.40	96,540.22
Number of Employees	1,284.72	2,145.63	38	21,450
Net Fixed Assets (₹ million)	4,982.14	9,360.81	85.60	72,210.10
Materials Cost (₹ million)	3,674.90	6,845.37	42.15	51,332.40
Firm Size (log assets)	8.91	1.64	5.20	13.45
Foreign Shareholding (%)	18.62	21.44	0.00	89.50
Board Independence (%)	46.30	12.18	20.00	85.00
Managerial Efficiency Score	0.71	0.14	0.32	0.96

Table 4. Stochastic frontier production function estimates

Variable	Coefficient	Std. error	z-statistic
Constant	0.842***	0.091	9.25
ln(Labour)	0.312***	0.041	7.61
ln(Capital)	0.274***	0.038	7.21
ln(Materials)	0.421***	0.029	14.52
Sigma-squared (σ^2)	0.187***	0.024	7.79
Gamma (γ)	0.763***	0.061	12.51

Log-likelihood: -1,842.36; Observations: 4,850; Firms: 485; *** p<0.01

above 0.80. Only a relatively small proportion of firms remain below the 0.50 threshold.

This distribution suggests that although many firms operate reasonably close to frontier performance, substantial inefficiencies persist for a notable segment of the sample. The existence of a lower-efficiency tail indicates that differences in managerial effectiveness are not merely marginal but can be economically significant. These findings provide support for Hypothesis H2 and further highlight the relevance of examining the determinants of managerial efficiency.

4.5 Industry Differences in Managerial Efficiency

Industry-specific heterogeneity is controlled using National Industrial Classification (NIC) industry dummy variables. These controls account for technological differences, production structures and sectoral characteristics that may influence efficiency independently of managerial performance.

Average efficiency scores across industries are reported in Table 7. The results reveal clear sectoral differences, suggesting that managerial performance is influenced not only by firm-specific characteristics but also by industry context.

Pharmaceutical firms exhibit the highest average efficiency score (0.81), followed closely by the IT and software sector (0.79). Chemicals and automobiles occupy intermediate positions, while textiles and metals report comparatively lower efficiency levels.

Several factors may explain these differences. Knowledge-intensive sectors such as pharmaceuticals and information technology are typically exposed to stronger international competition, rapid innovation cycles, and higher performance expectations. These conditions often encourage continuous process improvement and managerial adaptation. In contrast, industries characterised by more rigid production systems and lower innovation intensity may face fewer incentives to optimise operations.

Although these comparisons are descriptive, they indicate that industry characteristics may influence the extent to which firms approach frontier performance and deserve further investigation in future research.

4.6 Time Pattern in Managerial Efficiency

Table 8 and Figure 3 present the evolution of average efficiency scores during the study period. The overall trend points toward gradual improvement in managerial efficiency, although the pattern is not strictly linear.

Average efficiency increased from 0.67 in 2015 to 0.72 in 2019, indicating steady gains in operational performance before the COVID-19 pandemic. The decline to 0.70 in 2020 coincides with widespread economic disruption, supply-chain interruptions, and heightened uncertainty faced by firms during that period.

The subsequent recovery is noteworthy. Efficiency increased to 0.73 in 2021 and reached 0.75 by 2022, exceeding pre-pandemic levels. This rebound suggests that firms were able to adapt relatively quickly to changing conditions through operational adjustments, technological adoption, and improved managerial practices.

Table 5. Inefficiency effects model

Variable	Coefficient	Std. error	Effect
Constant	0.912***	0.134	—
Firm Size (log assets)	-0.146***	0.039	Reduces inefficiency
Foreign Shareholding (%)	-0.008**	0.004	Reduces inefficiency
Board Independence (%)	-0.011***	0.003	Reduces inefficiency
Market Concentration (HHI)	0.217**	0.093	Increases inefficiency

*** p<0.01, ** p<0.05

Table 6. Distribution of managerial efficiency scores

Efficiency range	Firms	Percentage
< 0.50	52	10.7%
0.50-0.65	126	26.0%
0.65-0.80	198	40.8%
> 0.80	109	22.5%
Total	485	100%

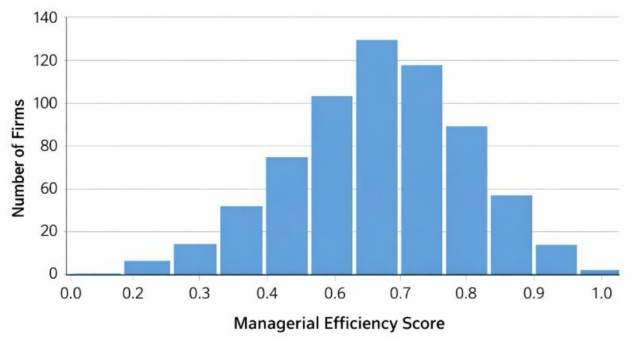


Figure 2. Distribution of managerial efficiency scores.

Table 7. Industry-wise average managerial efficiency

Industry (NIC)	Mean efficiency	Rank
Pharmaceuticals	0.81	1
IT and Software	0.79	2
Chemicals	0.74	3
Automobiles	0.71	4
Textiles	0.66	5
Metals	0.63	6

Table 8. Time trend in managerial efficiency

Year	Mean efficiency
2015	0.67
2016	0.68
2017	0.69
2018	0.71
2019	0.72
2020	0.70
2021	0.73
2022	0.75

The time-series evidence indicates a positive long-term trajectory in managerial efficiency while also demonstrating the sensitivity of organisational performance to major external shocks.

Since the study covers 2015-2022, the estimation controls for macroeconomic disturbances through year fixed effects. A dummy variable representing the COVID-19 period (2020-2021) is also included to isolate pandemic-related production disruptions from managerial inefficiency.

Accordingly, Hypothesis H5 receives partial support.

4.7 Summary of Hypothesis Testing

Table 9 summarises the empirical findings relative to the study hypotheses. The results provide broad support for the proposed framework.

The analysis confirms that inefficiency represents a significant component of firm performance differences and that managerial efficiency varies considerably across firms. Governance-related variables, including foreign ownership and board independence, are associated with lower inefficiency, while market concentration is linked to weaker performance outcomes. Evidence of improvement over time is also observed, although the temporary decline during 2020 prevents full support for the time-trend hypothesis.

Taken together, the findings suggest that managerial efficiency constitutes an important source of competitive advantage among Indian listed firms. Differences in governance quality, ownership structure, and competitive environment contribute meaningfully to explaining why some firms consistently operate closer to their productive potential than others.

5. Discussion

The findings provide strong evidence that managerial efficiency constitutes an important source of performance variation among Indian listed firms. The estimated frontier results indicate that a substantial proportion of output differences cannot be explained solely by random shocks or measurement errors. Instead, managerial inefficiency accounts for a significant share of the observed variation, suggesting that differences in managerial practices and organisational effectiveness

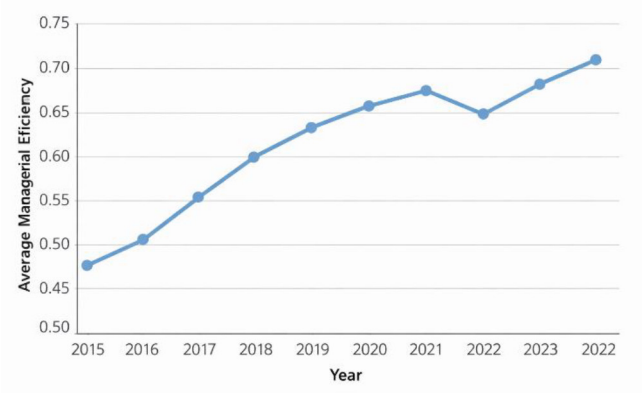


Figure 3. Time trend in average managerial efficiency.

Table 9. Hypotheses testing summary

Hypothesis	Statement	Result
H1	Inefficiency negatively affects performance	Supported
H2	Efficiency varies across firms	Supported
H3	Managerial factors affect inefficiency	Supported
H4	Better governance improves efficiency	Supported
H5	Efficiency improves over time	Partially Supported

continue to influence firm outcomes even after controlling for production inputs.

One of the most noteworthy findings is the relatively high value of the gamma parameter, which indicates that inefficiency rather than stochastic noise explains most of the unexplained variation in output. This result reinforces the argument that firm performance should not be viewed exclusively through the lens of market conditions or resource availability. Firms operating with similar inputs often achieve markedly different outcomes because managerial decisions affect how effectively those resources are deployed. The evidence therefore supports the broader efficiency literature, which emphasises managerial capability as a critical determinant of organisational performance.

The average efficiency score of 0.71 further suggests that many firms operate below their productive potential. While a number of firms approach frontier performance, the existence of a substantial efficiency gap indicates that considerable opportunities remain for improving resource utilisation and managerial effectiveness. This observation is particularly relevant in the Indian context, where firms increasingly compete in both domestic and global markets. As competitive pressures intensify, the ability to convert resources into output efficiently may become an increasingly important source of sustainable advantage.

The governance-related findings provide additional insights into the mechanisms through which managerial efficiency can be improved. Larger firms appear to operate more efficiently than smaller firms, possibly because they possess stronger administrative systems, more specialised managerial structures, and greater access to organisational resources. Although size alone does not guarantee superior performance, larger organisations may benefit from formalised decision-making processes that reduce operational inefficiencies.

The negative association between foreign ownership and inefficiency highlights the potential governance benefits associated with international investment. Foreign shareholders often introduce higher disclosure standards, stronger monitoring practices, and greater emphasis on performance accountability. Their presence may therefore contribute to improved managerial discipline and more efficient resource allocation. This finding is consistent with the view that ownership structure influences not only financial outcomes but also internal managerial behaviour.

Board independence also emerges as an important determinant of efficiency. Firms with a greater proportion of independent directors tend to operate closer to the estimated production frontier. This result lends support to agency-theory arguments that effective oversight can reduce managerial discretion and align decision-making more closely with organisational objectives. The finding is particularly relevant given the increasing emphasis on governance reforms within the Indian corporate sector. While compliance with governance requirements is important, the results suggest that genuinely effective board oversight can generate measurable efficiency benefits.

The positive relationship between market concentration and inefficiency underscores the role of competition as an external disciplinary mechanism. Firms facing stronger competitive pressures appear more likely to optimise resource use and improve operational performance. In contrast, organisations operating in concentrated markets may encounter fewer incentives to pursue efficiency improvements. This finding is consistent with the broader economic argument that competition encourages innovation, responsiveness, and managerial accountability. It also suggests that market structure should be considered alongside internal governance mechanisms when evaluating organisational performance.

The industry-level analysis reveals that managerial efficiency is not distributed uniformly across sectors. Higher efficiency scores in pharmaceuticals and information technology may reflect the influence of innovation intensity, global market exposure, and continuous performance benchmarking. These industries often operate in environments characterised by rapid technological change and strong international competition, conditions that can encourage greater managerial adaptability. Conversely, lower efficiency levels in traditional sectors such as textiles and metals may indicate structural constraints, legacy production systems, or weaker competitive pressures.

The temporal analysis offers additional insights into the dynamic nature of managerial efficiency. The general upward trend observed during the study period suggests gradual improvements in managerial practices and operational capabilities among Indian firms. The temporary decline in 2020 appears largely attributable to the unprecedented disruptions associated with the COVID-19 pandemic rather than a deterioration in managerial competence. The subsequent recovery demonstrates a notable degree of organisational resilience and adaptability. Many firms appear to have adjusted their operating models, adopted digital processes, and implemented more flexible management practices in response to changing economic conditions.

Taken together, the findings highlight the importance of viewing managerial efficiency as a multidimensional organisational outcome influenced by governance structures, ownership characteristics, market competition, and industry context. The results suggest that improvements in managerial performance are unlikely to arise from a single intervention. Instead, efficiency gains are more likely when firms combine effective governance arrangements with competitive discipline and adaptive managerial practices.

From a managerial perspective, the study emphasises that efficiency should be treated as a strategic objective rather than merely an operational metric. Investments in governance quality, board effectiveness, managerial capability development, and organisational systems may contribute to performance improvements that extend beyond traditional financial indicators. For policymakers, the results reinforce the value of governance reforms and competitive market structures in fostering more productive and efficient firms.

The evidence supports the view that managerial efficiency remains a significant and measurable driver of firm performance in India. While resources and market conditions undoubtedly matter, the manner in which managers utilise available resources continues to play a central role in determining organisational success.

6. Conclusion

This study examined managerial efficiency among Indian listed non-financial firms during the period 2015-2022 using a stochastic frontier framework. By distinguishing inefficiency from random disturbances, the analysis provides evidence that managerial performance remains an important determinant of firm-level outcomes beyond the effects of production inputs and external market conditions.

The findings indicate that a substantial proportion of performance variation among firms can be attributed to differences in managerial efficiency. The average efficiency score suggests that many firms continue to operate below their estimated productive potential, highlighting opportunities for improved resource utilisation and organisational performance. The results

also demonstrate that managerial efficiency is not distributed uniformly across firms, industries, or time periods, reinforcing the view that managerial capability represents an important source of competitive advantage.

The study further shows that governance and market conditions influence efficiency outcomes. Larger firms, firms with greater foreign ownership, and firms characterised by stronger board independence tend to operate closer to the production frontier. In contrast, firms operating in more concentrated industries exhibit relatively higher levels of inefficiency. These findings suggest that both internal governance mechanisms and external competitive pressures contribute to shaping managerial behaviour and organisational effectiveness.

From a practical perspective, the results emphasise that efficiency improvement should not be viewed solely as an operational concern. Governance quality, ownership structure, board effectiveness, and competitive discipline appear to play important roles in creating an environment that supports efficient managerial decision-making. Managers seeking sustained performance improvements may therefore benefit from strengthening organisational oversight mechanisms alongside operational capabilities.

The study also offers implications for policymakers and regulators. Continued efforts to enhance corporate governance standards, improve transparency, and promote competitive market structures may contribute not only to stronger financial performance but also to higher levels of managerial efficiency across firms. As India continues to integrate with global markets, the ability of firms to deploy resources efficiently will remain an important determinant of long-term competitiveness and economic growth.

Despite these contributions, several limitations should be acknowledged. First, the analysis focuses exclusively on listed non-financial firms and therefore may not fully capture efficiency dynamics within privately held enterprises or financial institutions. Second, managerial efficiency is estimated using quantitative firm-level data and may not reflect qualitative dimensions of managerial capability such as leadership style, organisational culture, or innovation practices. Third, although the study incorporates governance and market-structure variables, other factors—including managerial experience, technological adoption, and human capital development—could also influence efficiency outcomes.

Future research may extend this work in several directions. Comparative studies involving other emerging economies could provide a broader perspective on managerial efficiency within different institutional environments. Researchers may also examine sector-specific efficiency dynamics or explore the influence of digital transformation, sustainability initiatives, and artificial intelligence adoption on managerial performance. In addition, integrating qualitative evidence with frontier-based efficiency measures may offer a more comprehensive understanding of the mechanisms through which managerial capabilities influence firm outcomes.

In conclusion, the evidence suggests that managerial efficiency remains a significant and measurable factor underlying firm performance in India. While access to resources and favourable market conditions are important, the ability of managers to deploy those resources effectively continues to distinguish higher-performing firms from their peers. Understanding the organisational and institutional factors that support managerial efficiency therefore remains an important area for both academic inquiry and managerial practice.

7. Directions for Future Research

The present study opens several promising avenues for future research. First, comparative analyses involving multiple emerging and developed economies would provide deeper insights into how institutional environments and governance systems shape managerial efficiency across different regulatory and competitive contexts. Second, future studies could investigate sector-specific efficiency dynamics using industry-specific frontier models that better capture technological heterogeneity within manufacturing and service industries. Third, researchers may extend the inefficiency model by incorporating variables related to

digital transformation, artificial intelligence adoption, environmental sustainability, innovation capability, ESG performance, and organisational resilience to better understand emerging drivers of managerial efficiency. Finally, mixed-method research combining stochastic frontier estimation with qualitative evidence obtained through interviews, case studies, or managerial surveys could provide richer explanations of the organisational processes through which managerial capability influences firm performance.

In conclusion, the study demonstrates that managerial efficiency represents a significant, measurable, and strategically important determinant of firm performance in the Indian corporate sector. While access to financial resources, technology, and favourable market conditions remains essential for organisational success, the ability of managers to deploy these resources efficiently ultimately distinguishes high-performing firms from their competitors. By integrating governance mechanisms, ownership structure, market competition, industry heterogeneity, and temporal effects within a unified stochastic frontier framework, the study provides robust empirical evidence that advances both academic understanding and managerial practice. As Indian firms continue to compete in increasingly dynamic and globally integrated markets, strengthening managerial efficiency will remain central to sustaining productivity, competitiveness, and long-term organisational growth.

8. Conclusion/Remarks

This study demonstrates that managerial efficiency is a significant and measurable determinant of firm performance among Indian listed non-financial firms. Using a stochastic frontier framework and panel data for 485 firms over 2015–2022, the findings indicate substantial variation in managerial efficiency, with firms achieving an average efficiency score of 0.71. The results further show that managerial inefficiency accounts for a substantial proportion of unexplained variation in firm output, highlighting the importance of managerial capability and effective resource utilisation.

The study also establishes that organisational governance and market conditions play important roles in shaping managerial efficiency. Larger firms, firms with greater foreign ownership, and firms with stronger board independence tend to operate closer to the production frontier, while higher market concentration is associated with greater managerial inefficiency. Significant differences are also observed across industries, with pharmaceuticals and information technology demonstrating relatively higher efficiency than traditional sectors such as textiles and metals. Although efficiency declined temporarily during the COVID-19 disruption in 2020, the subsequent recovery indicates considerable organisational adaptability and an overall improvement in efficiency over the study period.

The findings eventually emphasise that improving managerial efficiency requires more than increasing financial and physical resources. Strengthening corporate governance, enhancing board effectiveness, encouraging competitive market conditions, and developing organisational capabilities can contribute to more efficient resource utilisation and sustained firm performance. The study therefore provides useful implications for managers, investors, and policymakers seeking to improve organisational productivity and competitiveness in the Indian corporate sector.

9. Acknowledgements

The author gratefully acknowledges the support and academic guidance received from Koneru Lakshmaiah Education Foundation (KL University), Vaddeswaram, Guntur, Andhra Pradesh, India, during the course of this research. The author also acknowledges the CMIE Prowess database for providing the firm-level data used in the study. The author is thankful to colleagues and academic peers whose constructive suggestions and discussions contributed to the development and refinement of this research.

The author declares that no external financial support was received specifically for conducting this study.

10. References

Aghion, P., Bloom, N., Blundell, R., Griffith, R., & Howitt, P. (2005). Competition and innovation: An inverted-U relationship. *Quarterly Journal of Economics, 120*(2), 701-728. https://doi.org/10.1093/qje/120.2.701

Aigner, D., Lovell, C. A. K., & Schmidt, P. (1977). Formulation and estimation of stochastic frontier production function models. *Journal of Econometrics, 6*(1), 21-37. https://doi.org/10.1016/0304-4076(77)90052-5

Atika, A., Utami, E. R., & Simamora, A. J. (2022). Does managerial ability affect segment disclosure? Evidence from Indonesia. *Journal of Accounting and Investment*, *24*(1), 169-186. https://doi.org/10.18196/jai.v24i1.15975

Battese, G. E., & Coelli, T. J. (1995). A model for technical inefficiency effects in a stochastic frontier production function for panel data. *Empirical Economics, 20*(2), 325-332. https://doi.org/10.1007/BF01205442

Bertrand, M., & Schoar, A. (2003). Managing with style: The effect of managers on firm policies. *Quarterly Journal of Economics, 118*(4), 1169-1208. https://doi.org/10.1162/003355303322552775

Bhagat, S., & Bolton, B. (2008). Corporate governance and firm performance. *Journal of Corporate Finance, 14*(3), 257-273. https://doi.org/10.1016/j.jcorpfin.2008.03.006

Bloom, N., & Van Reenen, J. (2007). Measuring and explaining management practices across firms and countries. *Quarterly Journal of Economics, 122*(4), 1351-1408. https://doi.org/10.1162/qjec.2007.122.4.1351

Bloom, N., Genakos, C., Sadun, R., & Van Reenen, J. (2012). *Management practices across firms and countries*. National Bureau of Economic Research. https://doi.org/10.3386/w17850

Bhutta, A. I., Sheikh, M. F., Munir, A., Naz, A., & Saif, I. (2021). Managerial ability and firm performance: Evidence from an emerging market. *Cogent Business and Management*, *8*(1), 1-22. https://doi.org/10.1080/23311975.2021.1879449

Coelli, T. J. (1995). Recent developments in frontier modelling and efficiency measurement. *Australian Journal of Agricultural Economics, 39*(3), 219-245. https://doi.org/10.1111/j.1467-8489.1995.tb00552.x

Coelli, T. J., Rao, D. S. P., O'Donnell, C. J., & Battese, G. E. (2005). *An introduction to efficiency and productivity analysis* (2nd ed.). Springer.

Dasgupta, R., & Dhochak, M. (2022). Progenitors of firm's search behaviour: A country comparison of Australia vs. India. *Australasian Business, Accounting and Finance Journal*, *16*(6), 120-145. https://doi.org/10.14453/aabfj.v16i6.08

Demerjian, P., Lev, B., Lewis, M., & McVay, S. (2012). Quantifying managerial ability: A new measure and validity tests. *Management Science, 58*(7), 1229-1248. https://doi.org/10.1287/mnsc.1110.1487

Fama, E. F., & Jensen, M. C. (1983). Separation of ownership and control. *Journal of Law and Economics, 26*(2), 301-325. https://doi.org/10.1086/467037

Farrell, M. J. (1957). The measurement of productive efficiency. *Journal of the Royal Statistical Society: Series A, 120*(3), 253-290. https://doi.org/10.2307/2343100 PMid:26098465

Gbigbi, T. M. (2020). Technical efficiency and profitability of cassava production in delta state: A stochastic frontier production function analysis. *Journal of Tekirdağ Faculty of Agriculture*, *18*(1), 21-31. https://doi.org/10.33462/jotaf.693249

Greene, W. H. (2005). Reconsidering heterogeneity in panel data estimators of the stochastic frontier model. *Journal of Econometrics, 126*(2), 269-303. https://doi.org/10.1016/j.jeconom.2004.05.003

Greene, W. H. (2008). The econometric approach to efficiency analysis. In H. O. Fried, C. A. K. Lovell, & S. S. Schmidt (Eds.), *The measurement of productive efficiency and productivity growth* (pp. 92-250). Oxford University Press. https://doi.org/10.1093/acprof:oso/9780195183528.003.0002

Hossain, Md. F. (2021). Board composition, insider ownership and firm performance: Evidence from post-shock period of stock prices in Bangladesh. *Khulna University Business Review*, *15*(1), 7-17. https://doi.org/10.35649/kubr.2020.15.1.1

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics, 3*(4), 305-360. https://doi.org/10.1016/0304-405X(76)90026-X

Kumbhakar, S. C., & Lovell, C. A. K. (2000). *Stochastic frontier analysis*. Cambridge University Press. https://doi.org/10.1017/CBO9781139174411

Meeusen, W., & van den Broeck, J. (1977). Efficiency estimation from Cobb-Douglas production functions with composed error. *International Economic Review, 18*(2), 435-444. https://doi.org/10.2307/2525757

Minviel, J.-J., Kudawoo, Y., & Ben Bouheni, F. (2022). Persistent inefficiency, transient inefficiency and firm unobserved heterogeneity: A comparison of two frontier approaches using simulated and real data. *Journal of Economic and Administrative Sciences*, *40*(3), 469-481. https://doi.org/10.1108/jeas-10-2021-0216

Nickell, S. J. (1996). Competition and corporate performance. *Journal of Political Economy, 104*(4), 724-746. https://doi.org/10.1086/262040

Salehi, M., Daemi, A., & Akbari, F. (2020). The effect of managerial ability on product market competition and

corporate investment decisions. *Journal of Islamic Accounting and Business Research*, *11*(1), 49-69. https://doi.org/10.1108/jiabr-10-2016-0113

Shleifer, A., & Vishny, R. W. (1997). A survey of corporate governance. *Journal of Finance, 52*(2), 737-783. https://doi.org/10.1111/j.1540-6261.1997.tb04820.x

Syverson, C. (2011). What determines productivity? *Journal of Economic Literature, 49*(2), 326-365. https://doi.org/10.1257/jel.49.2.326

Yadav, G., Mangla, S. K., Bhattacharya, A., & Luthra, S. (2020). Exploring indicators of circular economy adoption framework through a hybrid decision support approach. *Journal of Cleaner Production*, *277*(2020), Article 124186. https://doi.org/10.1016/j.jclepro.2020.124186

Zamzamin, Z. Z., Haron, R., & Othman, A. H. A. (2021). Hedging, managerial ownership and firm value. *Journal of Asian Business and Economic Studies*, *28*(4), 263-280. https://doi.org/10.1108/jabes-08-2020-0101

Author Contribution

Savanam Chandra Sekhar: Conceptualization, literature review, methodology, data curation, formal analysis, investigation, statistical analysis, interpretation of results, writing—original draft, writing—review and editing, visualization, and project administration. The author approved the final version of the manuscript and accepts responsibility for all aspects of the work, including the accuracy and integrity of the research.