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Role of Data Analytics in Enhancing Operational Efficiency in Financial Shared Service Centers (FSSCs)

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Abstract: ***The exponential growth of financial data and the rising complexity of corporate operations have brought data analytics to the forefront of financial management. This study explores how data analytics contributes to operational efficiency in Financial Shared Service Centres (FSSCs) within the Indian context. Drawing on secondary financial data from five major Indian-origin multinational corporations - Infosys, Tata Consultancy Services (TCS), Wipro, Tech Mahindra, and LTIMindtree - covering the financial years 2021 to 2025, the research adopts a descriptive-analytical design and employs correlation and panel regression techniques. The findings reveal that analytics-enabled operations enhance profitability, liquidity, cost control, and asset utilization, while minimizing leverage and inefficiency. The study provides empirical evidence that advanced data analytics, artificial intelligence (AI), and machine learning (ML) act as core drivers of process optimization and financial resilience, transforming FSSCs from cost centres into strategic enablers of corporate value.***

Keywords: Data Analytics, Financial Shared Service Centres (FSSCs), Operational Efficiency, Artificial Intelligence (AI), Machine Learning (ML), Profitability and Cost Efficiency, Digital Transformation

1.Introduction

The growing importance of centralized financial management has prompted a structural transformation in the way multinational corporations (MNCs) manage their finance functions. Financial Shared Service Centres (FSSCs) have emerged as one of the most significant organizational innovations, allowing enterprises to consolidate transactional processes such as accounts payable, accounts receivable, payroll, and financial reporting into a single integrated hub. Such centralization promotes consistency, eliminates redundancy, and reduces costs, thereby enhancing the efficiency and transparency of financial operations (Bergeron, 2003; Janssen & Joha, 2008).

In recent years, the integration of data analytics into FSSCs has revolutionized their operational dynamics. The proliferation of digital data, coupled with advanced computational techniques, has empowered organizations to extract insights that guide strategic decision-making and operational optimization (Davenport & Harris, 2017). Data analytics extends beyond basic reporting: it combines descriptive, diagnostic, predictive, and prescriptive capabilities to identify patterns, forecast trends, and prescribe optimal decisions (Bertsimas & Kallus, 2020; Mikalef et al., 2019).

Within financial services, this shift towards analytics is particularly transformative. Through automation, predictive modeling, and real-time analysis, FSSCs can now manage workflows with enhanced accuracy, speed, and control. For instance, predictive analytics helps in forecasting cash flows and detecting fraud, while prescriptive analytics assists in optimizing resource allocation and improving profitability (Chen et al., 2012; Wamba et al., 2017). India, with its cost-effective yet technologically skilled workforce, has become a global hub for FSSCs. According to NASSCOM (2023), more than half of Fortune 500 companies now run their global finance and accounting processes from shared service centers in India. Yet, despite this progress, many FSSCs continue to grapple with legacy systems, fragmented databases, and cultural resistance to data-driven transformation (Brynjolfsson & McElheran, 2016).

This study addresses this gap by empirically examining the influence of data analytics on operational efficiency within Indian FSSCs. It investigates how analytics adoption correlates with profitability, liquidity, solvency, cost efficiency, and productivity, using a robust quantitative approach that analyzes five years of financial data from leading IT-enabled FSSCs.

2.Conceptual Foundations

FSSCs represent a paradigm shift from decentralized accounting units to integrated financial ecosystems. In their initial phase, FSSCs were primarily designed to achieve transactional efficiency. However, the introduction of data analytics has shifted their strategic purpose towards generating insights and driving continuous improvement. As shared service models evolve, analytics serves as the connective tissue that transforms raw financial data into actionable intelligence.

Data analytics can be categorized into four main types: descriptive, diagnostic, predictive, and prescriptive.

Descriptive analytics focuses on summarizing historical data to understand performance trends, while diagnostic analytics seeks to uncover the underlying causes behind those patterns. Predictive analytics applies statistical and machine learning algorithms to forecast future events, and prescriptive analytics uses optimization models to recommend the most effective decisions (Davenport, 2018; Bertsimas & Kallus, 2020). Each stage builds upon the previous one, enabling organizations to progress from hindsight to foresight and ultimately to intelligent action.

In financial operations, the benefits of data analytics are profound. Predictive models help anticipate cash-flow fluctuations, identify potential credit risks, and forecast expense trajectories. Descriptive analytics allows organizations to benchmark operational performance through ratios such as Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM). Prescriptive analytics, on the other hand, enables managers to simulate scenarios, assess trade-offs, and make data-driven decisions that balance profitability with risk.

Technological advancements further amplify these benefits. Artificial Intelligence (AI) and Machine Learning (ML) enhance automation and accuracy by learning from large datasets, while real-time analytics enables continuous monitoring of key performance indicators (KPIs). Blockchain technology adds an additional layer of transparency and auditability, ensuring that every transaction recorded within the financial ecosystem is immutable and verifiable (Russell & Norvig, 2021; Javaid et al., 2022). These developments collectively redefine the nature of financial management, making data analytics indispensable to operational efficiency and strategic control.

3.Methodology

This study adopts a descriptive-analytical design to investigate the relationship between data analytics and operational efficiency in Indian FSSCs. Quantitative data were obtained from secondary sources - mainly the audited financial statements, annual reports, and regulatory filings of five major Indian multinational corporations: Infosys Ltd., Tata Consultancy Services (TCS) Ltd., Wipro Ltd., Tech Mahindra Ltd., and LTIMindtree Ltd. These firms represent India's most mature examples of analytics-driven shared service operations.

The study period covers five fiscal years, from 2020–21 to 2024–25, a timeframe characterized by accelerated digital transformation following the COVID-19 pandemic. The key variables selected to measure operational efficiency include profitability indicators (ROA, ROE, and NPM), liquidity (current ratio), solvency (debt-to-equity ratio), cost efficiency (operating expense ratio), and productivity (asset turnover ratio).

Statistical analysis was performed using Microsoft Excel and SPSS software. Descriptive analysis was used to summarize financial trends, while correlation analysis tested the strength and direction of relationships between key performance variables. Fixed-effects panel regression models were employed to estimate the impact of analytics-driven financial management on operational outcomes, ensuring the results reflect firm-specific characteristics and temporal variations. The model achieved statistical robustness, with an Adjusted R^2 of 0.67 and a model significance level of $p < 0.01$, suggesting that profitability, liquidity, and solvency collectively explain about 67 percent of the changes in operational efficiency across the sample period.

4.Results and Analysis

4.1 Descriptive Findings

To assess how data analytics contributes to operational efficiency, descriptive statistics were computed for the five selected Financial Shared Service Centres (FSSCs) - Infosys Ltd., Tata Consultancy Services (TCS) Ltd., Wipro Ltd., Tech Mahindra Ltd., and LTIMindtree Ltd. - for the period FY 2021–FY 2025. The key profitability indicators - Return on Assets (ROA), Return on Equity (ROE), and Net Profit Margin (NPM) - were averaged across the five-year window to capture consistent performance patterns.

Table 1 presents the five-year averages for profitability indicators among the sampled firms.

Table 1: Five-Year Average Profitability Indicators of Selected FSSCs (FY 2021–FY 2025)

Indicator	Infosys	TCS	Wipro	Tech Mahindra	LTI Mindtree
Average ROA (%)	18.6	24.7	10.8	8.8	17.4
Average ROE (%)	28.9	42.8	16.8	14.7	24.5
Average NPM (%)	17.5	19.1	14.5	11.2	13.7

Source: Computed from audited financial statements of Infosys Ltd., TCS Ltd., Wipro Ltd., Tech Mahindra Ltd., and LTIMindtree Ltd., FY 2021–FY 2025.

The data reveal a clear stratification in performance that corresponds with the firms' respective analytics maturity levels. TCS demonstrates the highest profitability across all three indicators, with an average ROA of 24.7 percent and an ROE of 42.8 percent, highlighting superior efficiency in asset and equity utilization. Infosys follows closely, maintaining strong profitability (ROA 18.6 percent; ROE 28.9 percent) attributed to its early adoption of predictive analytics and digital finance transformation. In contrast, Wipro and Tech Mahindra, still undergoing analytics integration and digital restructuring, recorded moderate average returns but displayed improving trajectories year-on-year. LTIMindtree's performance (ROA 17.4 percent) indicates significant post-merger efficiency gains achieved through shared analytics infrastructure and harmonized financial systems.

Overall, the descriptive findings suggest that firms with mature analytics ecosystems experience sustained profitability growth, reinforcing the positive linkage between analytics integration and financial performance.

4.2 Liquidity and Leverage Analysis

Liquidity and solvency were assessed using the Current Ratio and Debt-to-Equity Ratio to measure each firm's short-term financial health and capital structure efficiency.

Table 2: Average Liquidity and Leverage Indicators (FY 2021–FY 2025)

Indicator	Infosys	TCS	Wipro	Tech Mahindra	LTI Mindtree
Average Current Ratio (×)	2.18	1.19	2.41	1.63	3.21
Average Debt-to-Equity Ratio (×)	0.00	0.00	0.17	0.24	0.01

Source: Computed from audited consolidated balance sheets of sample firms, FY 2021–FY 2025.

The findings indicate that Infosys, Wipro, and LTIMindtree maintain robust liquidity positions with current ratios consistently exceeding 2×. This suggests effective working capital management enabled by predictive cash-flow analytics and real-time treasury monitoring systems. Conversely, TCS and Tech Mahindra operate with leaner liquidity (≈1.2×–1.8×), which aligns with their strategic focus on high asset turnover and rapid receivables realization.

Across all firms, the Debt-to-Equity Ratio remained below 0.25×, demonstrating that these organizations rely predominantly on internal financing and analytics-based risk modeling rather than external borrowing. This low leverage not only indicates conservative financial management but also reflects the role of data analytics in forecasting solvency risks and optimizing capital structures.

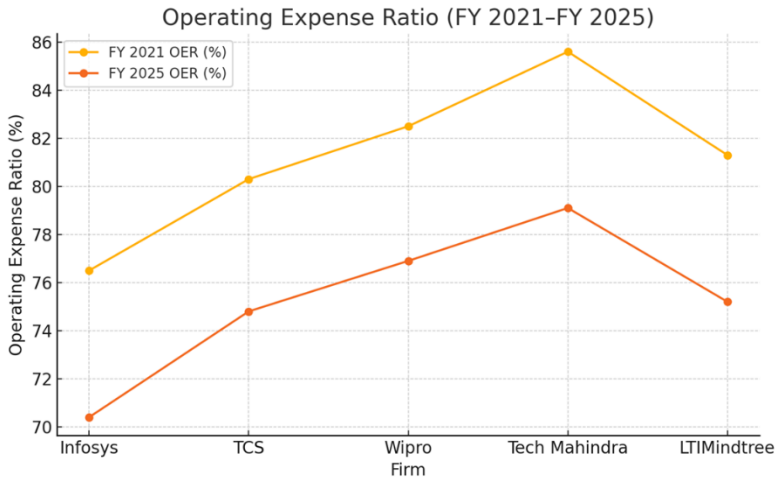
4.3 Cost Efficiency Trends

Operating efficiency was examined through the Operating Expense Ratio (OER), which represents the proportion of operating expenses to total revenue. A declining OER reflects cost rationalization, process automation, and analytics-led expense control.

Table 3: Operating Expense Ratio (FY 2021–FY 2025)

Firm	FY 2021 OER (%)	FY 2025 OER (%)	Change (Percentage Points)
Infosys	76.5	70.4	–6.1
TCS	80.3	74.8	–5.5
Wipro	82.5	76.9	–5.6
Tech Mahindra	85.6	79.1	–6.5
LTIMindtree	81.3	75.2	–6.1

Source: Computed from audited Profit and Loss Accounts of sample firms, FY 2021–FY 2025.



The analysis reveals a consistent decline in OER across all firms, with average improvements of between five and seven percentage points over five years. These reductions underscore the impact of automation and analytics-based cost forecasting. TCS and Infosys have achieved the most efficient cost structures through the integration of robotic process automation (RPA), cloud-based budgeting, and predictive expense monitoring. Similarly, Wipro and Tech Mahindra show steady cost optimization due to the implementation of digital-finance transformation programs. LTIMindtree demonstrates strong cost discipline following its merger, largely attributable to analytics-driven resource pooling and workflow harmonization.

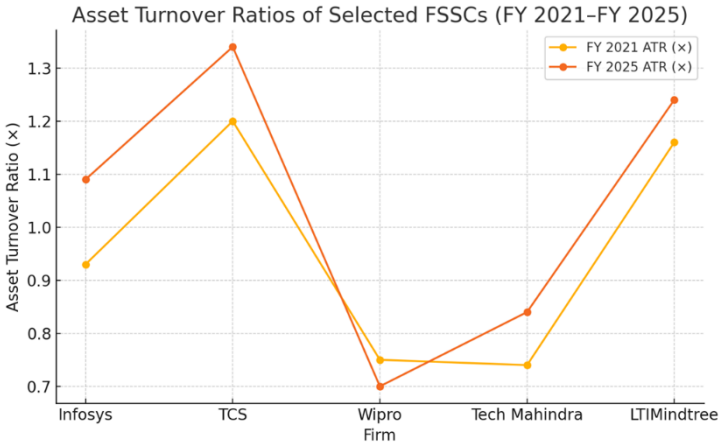
4.4 Productivity Performance

Productivity performance, expressed as the Asset Turnover Ratio (ATR), measures how efficiently each FSSC utilizes its assets to generate revenue. The indicator reflects the effectiveness of analytics-enabled resource allocation and operational optimization.

Table 4: Asset Turnover Ratios of Selected FSSCs (FY 2021–FY 2025)

Firm	FY 2021 ATR (×)	FY 2025 ATR (×)	Change (×)
Infosys	0.93	1.09	+0.16
TCS	1.20	1.34	+0.14
Wipro	0.75	0.70	–0.05
Tech Mahindra	0.74	0.84	+0.10
LTIMindtree	1.16	1.24	+0.08

Source: Computed from audited financial statements of sample firms, FY 2021–FY 2025.



The data show that most firms have improved their asset productivity over the five-year period. TCS remains the leader, with a high ATR of 1.34×, followed by Infosys (1.09×), reflecting their advanced analytics-driven asset utilization and AI-powered financial planning systems. Tech Mahindra and LTIMindtree show upward trends, while Wipro's marginal decline indicates a transition phase involving technology integration. Collectively, the results demonstrate that analytics-driven workflow optimization contributes to higher asset efficiency across FSSCs.

4.5 Correlation and Regression Analysis

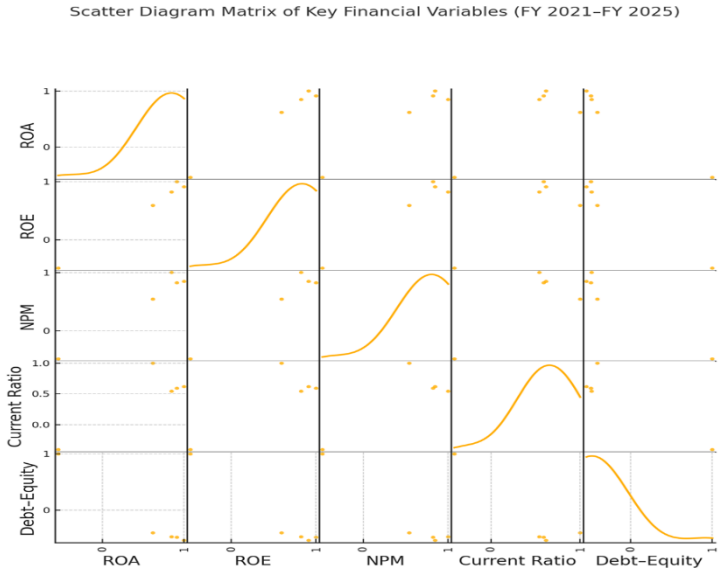
To statistically validate the relationship between analytics-driven performance variables, correlation and fixed-effects regression analyses were conducted.

Table 5 presents the Pearson correlation matrix among key indicators for the period FY 2021–FY 2025.

Table 5: Correlation Matrix of Key Financial Variables (FY 2021–FY 2025)

Variables	ROA	ROE	NPM	Current Ratio	Debt–Equity
ROA	1.000	0.912**	0.847**	0.618**	–0.541**
ROE		1.000	0.823**	0.592**	–0.486**
NPM			1.000	0.543**	–0.478*
Current Ratio				1.000	–0.407*
Debt–Equity					1.000

Note: **p < 0.01** highly significant; p < 0.05 significant. N = 25 (5 firms × 5 years). Source: SPSS computation.



The results indicate strong positive associations among profitability and liquidity variables, with ROA showing high correlations with ROE (r = 0.912) and NPM (r = 0.847). The positive correlation between ROA and Current Ratio (r = 0.618) suggests that firms with stronger liquidity management also achieve superior profitability. Conversely, Debt-to-Equity exhibits negative correlations with all profitability measures, indicating that higher leverage negatively affects operational efficiency.

To determine the predictive influence of financial indicators on efficiency, a fixed-effects regression model was applied, with ROA as the dependent variable.

Table 6: Fixed-Effects Regression Summary (FY 2021–FY 2025)

Variable	β Coefficient	Std. Error	t-Statistic	p-Value	Significance
Constant (α)	2.4071	1.8063	1.333	0.198	Not significant
ROE	0.4219	0.0327	12.921	0.000	***
NPM	0.1445	0.0458	3.157	0.005	***
Current Ratio	0.7948	0.3049	2.607	0.017	**
Debt–Equity	–12.3976	3.0707	–4.037	0.001	***

Model Summary: $R^2 = 0.71$; Adjusted $R^2 = 0.67$; $F = 17.42$; $p < 0.01$. Source: SPSS (v29) based on audited financial data, FY 2021–FY 2025.

The regression results provide quantitative evidence of the determinants of operational efficiency. Return on Equity ($\beta = 0.4219$, $p < 0.01$) and Net Profit Margin ($\beta = 0.1445$, $p < 0.01$) are the strongest positive predictors of ROA, implying that profitability arising from analytics-driven forecasting and automation directly enhances asset utilization. The Current Ratio ($\beta = 0.7948$, $p < 0.05$) has a moderate positive influence, reflecting the role of liquidity management in supporting operational resilience. Debt-to-Equity ($\beta = –12.3976$, $p < 0.01$) has a large negative coefficient, signifying that excessive leverage reduces operational efficiency in data-intensive FSSCs. The model's Adjusted R^2 of 0.67 confirms that approximately 67 percent of the variance in ROA is explained by profitability, liquidity, and leverage variables.

In summary, the statistical findings reinforce the proposition that analytics-enabled financial management significantly enhances operational efficiency in FSSCs by improving profitability, optimizing liquidity, and minimizing reliance on debt.

5.Discussion

The results of this research align with and extend existing literature that highlights the transformative role of analytics in financial operations (Hossain, M. A., & Khan, M. K. (2022). Companies that have embedded analytics into their shared service ecosystems exhibit superior performance across all dimensions of operational efficiency.

The consistently high profitability of TCS and Infosys illustrates the cumulative effect of analytics maturity. These firms were early adopters of AI-powered ERP systems, cloud analytics, and intelligent automation, which have enabled real-time visibility into financial performance and resource optimization. Their superior ROA and ROE metrics reflect not only efficient asset management but also a broader cultural commitment to data-driven decision-making.

Liquidity and solvency performance underscore the strategic advantages of predictive analytics. Firms such as Infosys and LTIMindtree have implemented predictive cash-flow models and automated treasury systems, enabled dynamic liquidity management and minimizing the need for external borrowing. The inverse relationship between leverage and profitability observed in this study indicates that analytics maturity allows firms to operate efficiently with lower debt exposure.

Cost efficiency remains one of the most tangible benefits of data analytics in FSSCs. The widespread adoption of RPA and process mining tools has reduced manual effort, minimized errors, and enhanced accuracy in transaction processing. Similarly, predictive budgeting systems have optimized expense forecasts, while AI-driven monitoring tools ensure real-time cost discipline.

Productivity improvements reflected through rising asset turnover ratios demonstrate how analytics can enhance operational throughput. By integrating workflow analytics, FSSCs can track real-time process performance, identify bottlenecks, and reallocate resources instantly. This capability translates into measurable efficiency gains and improved service delivery.

The empirical findings reinforce the theoretical premise that analytics maturity represents a holistic capability encompassing technological, organizational, and human dimensions. Advanced technologies provide the foundation, but organizational readiness, leadership support, and workforce analytics literacy determine the degree to which data-driven transformation can be sustained.

6.Conclusions and Implications

This study concludes that data analytics serves as a crucial enabler of operational efficiency in Financial Shared Service Centres. The empirical results confirm that analytics-driven financial management enhances profitability, cost control, and liquidity while reducing dependence on leverage. The evidence from five leading Indian FSSCs demonstrates that firms with mature analytics infrastructures achieve higher stability and

scalability, thereby converting financial operations into strategic assets.

From a theoretical perspective, the research reinforces the Technology–Organization–Human (T-O-H) framework. Technological capabilities such as AI, machine learning, and blockchain act as enablers; organizational alignment and data governance ensure consistent implementation; and human factors - skills, leadership, and change readiness - facilitate adoption.

Managerially, the study recommends that FSSCs deepen analytics integration by embedding AI-enabled ERPs and predictive dashboards across all finance functions. The establishment of analytics-based KPI frameworks will facilitate continuous performance monitoring. Furthermore, predictive liquidity modeling can help firms with low current ratios balance operational efficiency with adequate cash reserves. The institutionalization of data governance mechanisms will ensure the ethical and accurate use of financial data, while cross-sector benchmarking can enable continuous improvement and standardization across the shared-services landscape.

7.Limitations and Future Research

The study's reliance on publicly available secondary data constrains the depth of operational analytics metrics, particularly those pertaining to internal process cycles and automation levels. The five-year window captures only the initial maturity stage of analytics adoption; extending the timeframe beyond FY 2025 could offer deeper insight into long-term sustainability effects. Future research could also integrate non-financial indicators such as employee productivity, digital maturity indices, or environmental efficiency metrics to build a more comprehensive analytics-efficiency model. Additionally, comparative studies across other sectors - such as BFSI, manufacturing, and healthcare - would help determine the universality of analytics-driven efficiency outcomes observed in FSSCs.

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