Vol 10 No 1 | January - June 2025

aarthika charche

FPI Journal of Economics & Governance

Government of Karnataka
FISCAL POLICY INSTITUTE

Aarthika Charche FPI Journal of Economics & Governance
Vol 10 No 1 | January - June 2025

aarthika charche

FPI Journal of Economics & Governance

Aims and Scope of the Journal

Aarthika Charche is a bi-annual journal brought out by Fiscal Policy Institute, Government of Karnataka, Bengaluru. Addressed to practitioners, academics, government and non-government entities, the aim of the journal is to feature articles which bring an innovative, insightful, and influential view-point on financial and fiscal issues in government and governance. Aarthika Charche is now recognised by protocols of University Grants Commission (UGC) in India as an academic journal under UGC-Consortium for Academic and Research Ethics (CARE) - Reference List of Quality Journals- Group I (Social Sciences).

aarthika charche
FPI Journal of Economics & Governance

Contents

Director's Editorial

This is 19th Edition of Aarthika Charche: FPI Journal of Economics and Governance, comprising nine research articles on the current economic policy and governance issues at national and state levels. These articles are focused on economic and human development, governance and fiscal policy at national level, and state specific fiscal and other development issues of Karnataka and other states. These articles are written by both, young and senior, researchers in academic institutions located at different parts of India. Each article is distinguishable by its scientific contribution to evidence-based policy analyses and implications.

In addition, this Edition includes a review of the book on: Handbook on Inequality and Covid-19, edited by Kenneth A. Couch, and published Edward Elgar Publishing Limited (Cheltenham, UK) in 2025.

As per the decision of FPI's 21st Governing Council meeting on 6th May 2024, I welcome three new members to the Editorial Advisory Board (Professor Ravi Kanbur, Smt. Uma Mahadevan, and Professor N.R. Bhanumurthy). I thank three outgoing members of the Editorial Advisory Board (Dr Jyotsna Jha, Professor N.R. Vasudeva Murthy and Professor K. Shanmugham) for their contributions to the development of our Journal.

I am thankful to Sri. Ritesh Kumar Singh, IAS, Principal Secretary (Finance Department), Government of Karnataka and Chairperson, Governing Council, Fiscal Policy Institute, for his support and guidance for all initiatives and endeavours in the continued improvement of this Journal.

Dr Vishal R, IAS
Director

Grateful thanks are due to all the distinguished contributors, and the internal and external experts for peer reviewing of the articles published in this Edition. These articles use variety of data, such as, time series and cross-sectional macro data, micro survey data, and aggregate and disaggregate administrative data at national and sub-national levels, and apply statistical, econometric and computational methods to establish inferential foundations. In addition, they share best practices and approaches for policy design and implementation by national and sub-national policymakers.

We are thankful to the Edward Elgar Publishing Limited. Cheltenham (UK) for their continued patronage of latest books for Book Review in our Journal. In addition, all members of the Editorial Advisory Board and Editorial Team are thanked for their support for development of our Journal.

M.R. Narayana
Editor-in-Chief

Good governance, economic growth, and human development in India: A frequency domain causality analysis

Ayushi Vashistha [1] and C.R. Bishnoi [2]

Abstract

This study investigates the dynamic causal relationships among good governance, economic growth, and human development in India over the period 1996–2022, using the Breitung-Candelon frequency domain causality approach. Building upon a prior time-domain analysis (Vashistha and Bishnoi, 2024), which employed Johansen Cointegration, VECM, and Granger causality techniques, this study addresses a key limitation of those models by their inability to distinguish causality across different time horizons. By decomposing causality into short, medium, and long-term frequencies, the frequency domain approach provides scale-specific insights into how these variables interact over time. The empirical findings reveal that good governance is a strong long-term predictor of both economic growth and human development, reinforcing the structural importance of institutional quality. Conversely, economic growth has a significant short and medium-term impact on governance, suggesting that income gains and fiscal capacity can facilitate administrative improvements. The study also finds that good governance positively influences human development across both short and long-term horizons, while human development does not significantly influence governance at any frequency. Furthermore, a long-run bidirectional relationship exists between economic growth and human development, highlighting their interdependence. This paper makes a dual contribution: it introduces frequency domain causality to the governance–growth–development nexus in the Indian context, and it offers horizon-specific policy recommendations that are more actionable than those derived from static models. The results provide critical insights for sequencing reforms, emphasizing quick-impact digital interventions in the short run and structural institutional investments for long-term development outcomes.

JEL Classification Codes: *E37, F21, F32, H110, O4, I310*

1. Introduction

The relationship between good governance, economic growth, and human development is a cornerstone of modern development economics. In the context of India, a country navigating rapid economic transformation alongside persistent institutional and social challenges, understanding the dynamic interplay among these three pillars is crucial for designing effective, inclusive, and sustainable policy interventions. This paper investigates these interconnections using an advanced methodological framework, frequency domain causality analysis, to explore how the direction and strength of these relationships evolve across short, medium, and long-term time horizons.

Existing studies on the governance–growth–development nexus have typically been grounded in time-domain econometric frameworks, offering important but static insights. These studies, both cross-country (Tarek and Ahmed, 2013; Emara & Chiu, 2016; Davis, 2016) and country-

[1] *Research Scholar, Department of Economics, IIS (Deemed to be University), Jaipur, India, 302020, E-mail: ayushivashistha.7@gmail.com*

[2] *Professor, Department of Economics, IIS (Deemed to be University), Jaipur, India, 302020, E-mail:crbishnoi@gmail.com*

specific (Pradhan and Sanyal, 2011; Singh, 2019; Naskar, Das and Chatterjee, 2023), often support one of four conceptual hypotheses: the supply-leading view (good governance drives growth and development), the demand-following view (development outcomes shape governance), the feedback view (bidirectional causality), and the neutrality view (no causality). However, these studies often overlook the temporal structure of causality, assuming that relationships are stable and linear over time.

Our previous study (Vashistha and Bishnoi, 2024) contributed to this literature by applying time-domain tools, Johansen Cointegration, Vector Error Correction Model (VECM), and Granger causality tests to Indian data (1996–2022), revealing that economic growth Granger-causes governance and that a long-run equilibrium exists among governance, growth, and development. However, time-domain methods aggregate causality across all frequencies, failing to reveal whether these relationships manifest in the short term (policy shocks), medium term (transitional dynamics), or long term (institutional effects).

To address this methodological limitation, the current study applies the Breitung-Candelon (2006) frequency domain causality test, which decomposes causal relationships into frequency-specific bands. This allows us to identify when governance reforms, economic growth, or development outcomes begin to affect one another, and whether their influence is transitory or structural. In doing so, we not only extend the previous analysis but reframe it in a way that is both theoretically richer and practically more actionable.

Much like fields such as climate science or medicine, where researchers routinely revisit core variables with more advanced tools to gain deeper temporal and structural insight, we adopt a similar approach here. As in studies that re-express the inflation–interest rate nexus or carbon emissions–climate change link across scales, our study shows that new analytical methods can uncover patterns that remain hidden under older models.

Though both studies share the same dataset and variables, this methodological progression from static causality to dynamic, scale-specific causality justifies the current paper's contribution as novel, non-redundant, and impactful. Where the earlier paper yielded broad recommendations, the current study reveals time-sensitive causality patterns: for instance, economic growth influences governance in the short and medium term, while governance impacts growth and development more strongly in the long term. Such clarity is essential for sequencing reforms, e.g., implementing quick wins like digital service delivery while simultaneously investing in long-term judicial and institutional improvements.

To our knowledge, this is the first study in the Indian context to apply frequency domain causality to the governance–growth–development triad. While Huang (2015) and Huang and Ho (2016) use frequency domain tools to examine governance-growth relations across Asia, they exclude human development and overlook the Indian case. Hence, this study fills in an important empirical and methodological gap, offering both conceptual depth and actionable recommendations for policymakers.

This paper contributes to the literature in two principal ways. First, it introduces a robust frequency-domain methodology to assess dynamic causal linkages that vary across time horizons, capturing both lead–lag relationships and cyclic patterns that time-domain models miss. Second, it provides granular, horizon-specific policy guidance, highlighting when and how governance reforms or development investments are most likely to affect economic outcomes. Such insight is essential in India, where policy efficacy often depends on timing, institutional maturity, and societal readiness.

The paper is structured as follows: Section 2 outlines the data and model specification. Section 3 presents the theoretical framework and implementation of the Breitung-Candelon frequency domain causality test. Section 4 discusses the empirical findings in light of both the time and frequency dimensions. Section 5 concludes with major policy takeaways and implications.

2. Model specification and description of data

2.1. Model specification

We employed the following econometric model to examine the relationship between economic growth, good governance, and human development in India:

$$GNIPC_t = \beta_0 + \beta_1 GGI_t + \beta_2 HDI_t + \varepsilon_t \quad (1)$$

where GNIPC represents gross national income per capita, a measure of economic growth; GGI is the good governance index, and HDI is the human development index. β_0 is the intercept term, β_1 and β_2 are regression coefficients, t is the time subscript, and ε is the stochastic error term. This study uses time series data for the period from 1996 to 2022 sourced from the World Bank.

2.2. Description of data

2.2.1. Good Governance Index

This paper first constructs a Good Governance Index (GGI) using the Principal Component Analysis (PCA) technique. The PCA uses the following six World Governance Indicators to construct GGI;

Control of Corruption (CC),

Government Effectiveness (GE),

Political Stability and Absence of Violence/ Terrorism (PS),

Regulatory Quality (RQ),

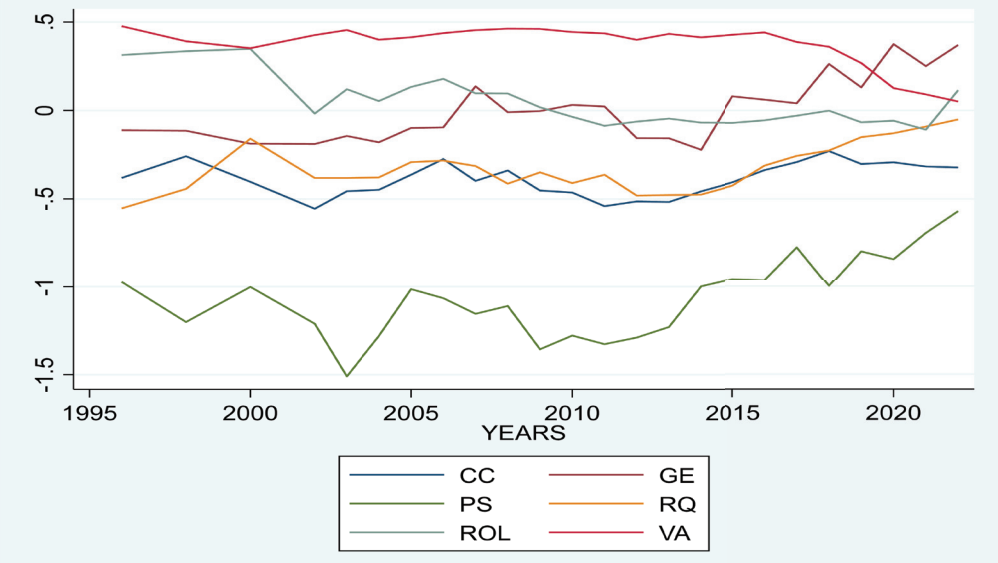
Rule of Law (ROL), and

Voice and Accountability (VA).

CC measures the extent to which public power is exercised for private gain. This includes petty and grand forms of corruption, as well as the undue influence of elites and private interests in state affairs. It reflects how far public authority is exploited for personal advantage and how deeply state capture by powerful groups is embedded. GE assesses perceptions of public service quality, the competence and independence of the civil service from political pressures, the effectiveness of policy formulation and implementation, and the credibility of government commitments to its policies. PS captures perceptions regarding the likelihood of political instability and politically motivated violence, including terrorism. RQ assesses perceptions of the government's ability to design and implement sound policies and regulations that promote private sector development. ROL indicates the level of confidence in and adherence to societal rules, particularly in areas such as contract enforcement, property rights, policing, the judiciary, and the prevalence of crime and violence. VA measures the extent to which citizens can participate in the selection of their government, as well as the freedoms of expression, association, and the press.

The World Governance Indicator (WGI) database provides data on governance indicators on a scale from -2.5 (weak) to 2.5 (strong) and is ranked from 0 (lowest) to 100 (highest). Data for 1996 to 2002, originally biannual, was converted to annual using linear interpolation to ensure consistency. The trend of indicators of good governance in India during the period from 1996 to 2022 is displayed in Figure 1.

Figure 1: Trends of India's Good Governance, Economic growth and Human Development



Source: Constructed by authors.

Figure 1 shows that in 1996, India positioned itself within the mid-range of good governance according to the estimates of the indicators, indicating a balanced performance. However, recent data reveals a combination of continuity and changes in the governance scenario. The estimates in 2022 show CC at -0.32, GE at 0.37, PS at -0.57, RQ at -0.05, ROL at 0.11, and VA at 0.05. Noteworthy is the marginal improvement in indicators like CC and GE, contrasted with a decline in the ranks of ROL and VA. These transitions highlight the evolving governance challenges encountered by India. The good governance indicators are consistently high and stable. PS shows significant improvement after 2005. The other indicators exhibit minor fluctuations but remain relatively stable overall.

As discussed earlier, PCA is used to construct GGI encompassing six good governance indicators. The results of the PCA are displayed in Table 1.

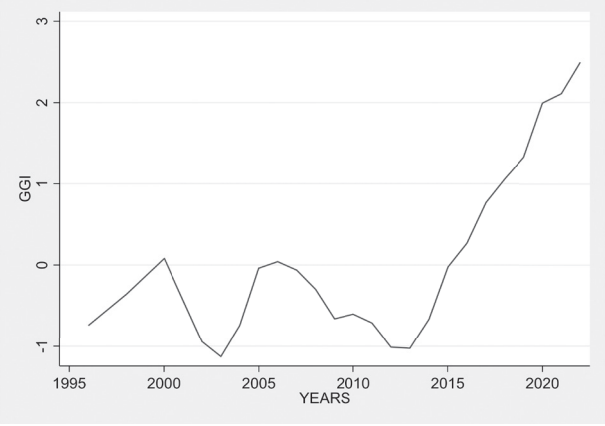
Table 1: Principal Component Analysis (PCA) for Good Governance Index

Values & Variables	**PCA 1**	**PCA 2**	**PCA 3**	**PCA 4**	**PCA 5**	**PCA 6**
Eigenvalues	3.477	1.292	0.544	0.350	0.212	0.126
% of Variance	57.945	21.530	9.066	5.827	3.525	2.107
Cumulative %	57.945	79.475	88.541	94.368	97.893	100.000
Variables	**Vector 1**	**Vector 2**	**Vector 3**	**Vector 4**	**Vector 5**	**Vector 6**
CC	0.782	0.423	0.651	0.550	0.410	-0.525
GE	0.423	0.789	0.703	0.746	-0.397	-0.781
PS	0.651	0.703	0.761	0.738	-0.046	-0.747
RQ	0.550	0.746	0.738	0.745	-0.207	-0.766
ROL	0.410	-0.397	-0.046	-0.207	0.899	0.273
VA	-0.525	-0.781	-0.747	-0.766	0.273	0.793

Source: Constructed by authors.

The eigenvalues given in Table 1 indicate that the first principal component (PCA1) explains 57.94 per cent of the standardised variance, while the second (PCA2) and third (PCA3) principal components account for only 21.53 per cent and 9.06 per cent of the variance, respectively. Thus, the PCA1 is the best index, denoted as the GGI. The PCA1 is calculated as a linear amalgamation of six metrics of good governance (CC, GE, PS, RQ, ROL, and VA), with their weights determined by the first eigenvector. Figure 2 plots the good governance index of India.

Figure 2: Trend of Good Governance Index in India



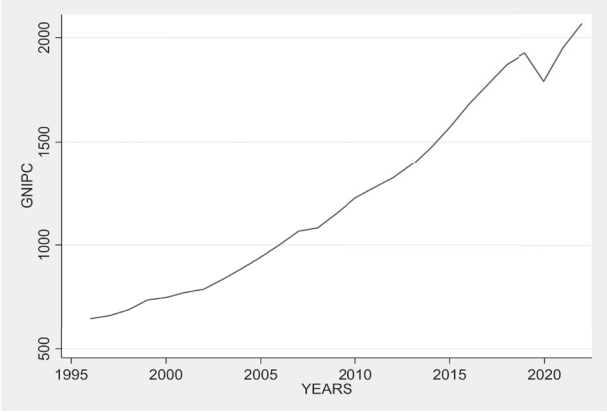
Source: Constructed by authors.

Figure 2 shows that the GGI demonstrates volatility, suggesting a less mature governance sector in India. Nonetheless, the GGI exhibits an upward trajectory, correlating with the rise in GNIPC and the HDI.

2.2.2. Economic Growth Indicator

Gross national income per capita at constant 2015 US$ is used in this study as economic growth indicator. The trend of economic growth indicator is shown in Figure 3.

Figure 3: Trend of India's Economic Growth Indicator



Source: Constructed by authors.

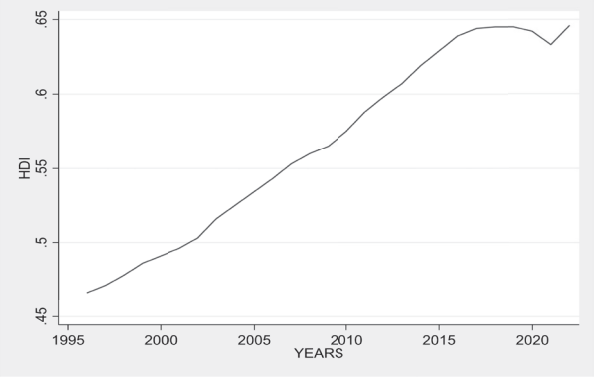
Figure 3 shows that the economic growth indicator, represented by GNI per capita, shows a steady and continuous increase, indicating consistent economic growth over the period, with slight dips around 2019-2020 before resuming its upward trend. In 1996, India's real GNI per capita was US$ 646.80, which increased sharply to 2067.40 in 2022 due to effective macroeconomic policies.

2.2.3. Human Development Indicator

The human development indicator is represented by the Human Development Index (HDI). The HDI was introduced by the United Nations Development Programme (UNDP) in 1990 as part of its first Human Development Report (HDR). The concept was developed by Pakistani economist Mahbub ul Haq, with significant contributions from Indian economist Amartya Sen. The HDI was created to shift the focus of development economics from national income accounting, GDP, to people-centred policies that measure human well-being and capabilities. The HDI measures human development based on

three core dimensions: Health – Life expectancy at birth, Education – Mean years of schooling and expected years of schooling, and Standard of living – Gross National Income (GNI) per capita (PPP). The trend of HDI is shown in Figure 4.

Figure 4: Trend of India's Human Development Index



Source: Constructed by authors.

Figure 4 shows that HDI has been rising consistent over the period under study. The value of HDI increased from 0.466 in 1996 to 0.646 in 2022, transitioning it from the low to the medium HDI category.

These indicators illustrate the good governance, economic growth, and human development in India over the specified period and underscore the examination of this interconnectedness.

3. Methodology

The econometric methodology of this paper consists of four steps. First, we determine the descriptive statistics of the variables in the dataset. Second, we examine the stationarity characteristics of the variables using the Augmented Dickey-Fuller (ADF) test (Dickey and Fuller, 1979) and the Phillips-Perron (PP) test (Phillips and Perron, 1988). Third, we establish the optimal lag length to be used in the model. Finally, we examine the causal relationship between good governance, economic growth, and human development using the frequency domain approach. This approach was introduced in the literature by Breitung and Candelon (2006). Specifically, we employ this technique in conjunction with Granger's (1969) causality tests. This method enables us to determine causality across various frequencies, related to various time periods: short-term (temporary), medium-term (intermediate), and long- term (permanent).

3.1. Frequency domain causality test

Granger (1969) was the first econometrician to propose a formal test to examine the causality between variables. This test is often inadequate to distinguish between long-run and short-run causality, as it is primarily based on one-period-ahead predictions. (Clive and Lin, 1995).

To capture dynamic causality encompassing short, medium, and long-run relationships Ding et al. (2006) suggested that frequency domain causality test is more suitable. This test enables the estimation of causal relationships at different frequencies, thereby distinguishing between temporary and permanent causality. For this reason, this paper proposes the use of Breitung - Candelon frequency domain causality test.

The Breitung-Candelon frequency domain causality test identifies the causal relationship between two variables across different frequency domains within a bivariate VAR framework by imposing linear restrictions on the autoregressive parameters. This approach builds upon the earlier work of Geweke (1982) and Hosoya (1991) and is briefly explained in the Appendix.

The results of frequency domain causality test are interpreted in two different ways: the use of F-statistic and visual representation of results.

3.2. Interpretation of results of frequency domain causality test by F- statistic

The Breitung-Candelon frequency domain causality test results are interpreted using F-statistic in the following manner:

- If F-statistic ≤ F - critical value at 5 per cent significant level or p ≥ 0.05, do not reject null hypothesis of no causality, which means there is no causality at frequency ω.
- If F-statistic > F - critical value at 5 per cent significant level or p < 0.05, reject null hypothesis of no causality, which means there is causality at frequency ω.

Further,

- If null hypothesis is rejected at low frequencies, then there is causality in the long -run.
- If null hypothesis is rejected at medium frequencies, then there is causality in the medium - run
- If null hypothesis is rejected at high frequencies, then there is causality in the short-run -run.

3.3. Visual representation of frequency domain causality results

For better understanding, the results of the Breitung-Candelon frequency domain causality test can be shown with the help of graph. X-axis of graph shows frequency $\omega \in [0,\pi]$ in radians and F-statistic from the Breitung-Candelon frequency domain causality test is shown on Y-axis. The calculated F-statistic at each frequency is shown by solid line and dashed horizontal straight red line shows critical F value at 5 per cent lever of significance.

If F-statistic crosses the critical dashed horizontal straight red line, reject null hypothesis of no causality at that frequency. Conversely if F-statistic is below the critical dashed horizontal straight red line, do not reject null hypothesis of no causality at that frequency. The relationship between F-statistic or p value, shape of graph and corresponding results can be understood with the help of Table 2.

Table 2: Relationship between F-Statistic or P Value, shape of graph and corresponding results

F-statistic/p value	Shape of graph	Result
F -statistic > Critical value of F or p < 0.05	Solid line is above the critical red line	There is significant causality
F -statistic ≤ Critical value of F or p ≥ 0.05	Solid line is below the critical red line	There is no significant causality

Source: Constructed by authors.

By applying this frequency domain approach, the study enables a nuanced analysis of the causal relationships between good governance, economic growth, and human development across different time horizons. Unlike traditional time-domain methods, the frequency domain causality test captures short-term (temporary), medium-term (intermediate), and long- term(permanent). dynamics, providing a deeper understanding of how these variables interact over time. This approach allows for the identification of whether the causal effects are immediate, temporary, or permanent, thereby offering valuable insights for both academic research and policy formulation.

The following section presents the empirical findings derived from the application of this methodology, shedding light on the direction, strength, and frequency-specific nature of the interlinkages between good governance, economic growth, and human development in the Indian context.

4. Empirical results

4.1. Descriptive statistics

Descriptive statistics and a correlation matrix are shown in Table 3.

Table 3: Descriptive Statistics and Correlation Matrix

Descriptive Statistics			
Statistics	**GGI**	**GNIPC**	**HDI**
Mean	7.41E-07	1234.008	0.566
Median	-0.299	1150.422	0.565
Maximum	2.495	2067.404	0.646
Minimum	-1.126	646.795	0.466
Standard deviation	1.000	457.444	0.063
Skewness	1.179	0.361	-0.133
Kurtosis	3.395	1.773	1.570
Jarque-Bera test	6.437	2.278	2.380
P-value	0.040	0.320	0.304
No. of observations	27	27	27
Correlation Matrix			
GGI	1.000		
GNIPC	0.739	1.00	
HDI	0.589	0.970	1.000

Source: Constructed by authors.

Table 3 presents the descriptive statistics and correlation matrix of variables. Results reveal insightful trends. GGI is positively skewed and exhibits a leptokurtic distribution, with the Jarque-Bera test indicating a significant deviation from normality. GNIPC is slightly positively skewed and has a flatter distribution, but the Jarque-Bera test confirms normality. HDI is slightly negatively skewed and also shows a flatter distribution, with normality confirmed by the Jarque-Bera test.

The correlation matrix shows a strong positive correlation between GGI and GNIPC, suggesting that higher governance quality is associated with higher GNI per capita. There is a moderate positive correlation between GGI and HDI, indicating that better governance is linked to higher HD. Additionally, the very strong positive correlation between GNIPC and HDI highlights the close relationship between economic performance and HD.

4.2. Unit root test

The results of unit root tests performed using ADF and PP tests are given in Table 4.

Table 4: Unit root test results

Variables	Levels		First Difference		Outcome
	ADF	PP	ADF	PP	
GGI	-0.338	0.320	-2.661*	-2.661*	I(1)
GNIPC	1.284	2.402	-4.853***	-4.856***	I(1)
HDI	-1.470	-1.259	-2.842*	-2.842*	I(1)

Source: Constructed by authors.

Note : ***, **, * represents 10%, 5%, and 1% level of significance, respectively.

Table 4 displays the unit root test results for GGI, GNIPC, and HDI. The results indicate that all three variables are integrated of order one, I(1). In their levels, GGI, GNIPC, and HDI show non-stationarity, as both the ADF and PP tests reveal that the p-value is more than 0.5. However, after the first differencing, each series becomes stationary: GGI, GNIPC, and HDI all exhibit significant results in both the ADF and PP tests, confirming their stationarity at the first difference.

4.3. Optimal lag-order

After assessing the order of integration, the optimum lag length of variables in the VAR model is determined. The summarised findings are presented in Table 5.

Table 5: Optimal lag-order criteria based on VAR

Relationship	Optimum Lags
GGI-GNIPC	3
GGI-HDI	3
GNIPC-HDI	4

Source: Calculated by authors.

The results of Table 5 shows that optimum lag length is 3 for testing GGI-GNIPC and GGI-HDI causality and 4 for testing GNIPC-HDI causality.

4.4. Frequency domain granger causality test results

In the next step, this study examines the frequency domain causality between GGI and GNIPC, GGI and HDI, and GNIPC and HDI across the frequencies $\omega = 2.5$, $\omega = 1.5$, and $\omega = 0.5$, which correspond to the short-run, medium-run, and long-run, respectively. Causality in the short, medium, and long run indicates that the resulting causality is temporary, intermediate, and permanent. Additionally, Tastan (2015) recommends the use of formula $2\pi/\omega$ to estimate the period of the causality. According to this formula, the period of the causality is determined where ω is significant, followed by calculating the number of periods the causal relationship lasts. The results are presented in Table 6.

Table 6: Frequency domain granger causality test

Panel 1	Ho: GGI does not Granger causes GNIPC			H1: GNIPC does not Granger causes GGI		
	Permanent	Intermediate	Temporary	Permanent	Intermediate	Temporary
	$\omega = 0.5$	$\omega = 1.5$	$\omega = 2.5$	$\omega = 0.5$	$\omega = 1.5$	$\omega = 2.5$
	7.975** (0.018)	2.887 (0.236)	2.715 (0.257)	0.807 (0.667)	2.410*** (0.092)	5.461*** (0.065)

Panel 2	Ho: GGI does not Granger causes HDI			H1: HDI does not Granger causes GGI		
	Permanent	Intermediate	Temporary	Permanent	Intermediate	Temporary
	ω = 0.5	ω = 1.5	ω = 2.5	ω = 0.5	ω = 1.5	ω = 2.5
	10.251 (0.005)*	1.694 (0.428)	5.662 (0.058)**	2.598 (0.272)	2.622 (0.269)	2.633 (0.268)
Panel 3	**Ho: GNIPC does not Granger causes HDI**			**H1: HDI does not Granger causes GNIPC**		
	Permanent	Intermediate	Temporary	Permanent	Intermediate	Temporary
	ω = 0.5	ω = 1.5	ω = 2.5	ω = 0.5	ω = 1.5	ω = 2.5
	28.701 (0.000)*	42.589 (0.000)*	60.185 (0.000)*	4.857 (0.088)*	2.310 (0.314)	0.627 (0.732)

Source: Calculated by authors.

Note : ***,**,* represents 10%, 5%, and 1% level of significance, respectively.

Panel 1 of Table 6 focuses on exploring the causality between GGI and GNIPC. Next, in panel 2 we investigate the causality between GGI and HDI. Finally, in panel 3 we analyse the causality between GNIPC and HDI using the results of the frequency domain causality test based on the Granger causality test.

In Panel 1, the analysis of Granger causality between GGI and GNIPC reveals mixed results. At the permanent frequency (ω = 0.5), there is significant evidence (at 5 per cent level) that GGI Granger causes GNIPC, though no such evidence is found at intermediate or temporary frequencies. Conversely, the evidence for GNIPC Granger causing GGI is weak, with marginal significance at intermediate and temporary frequencies, but no significant causality at the permanent frequency.

In Panel 2, the results show that GGI consistently Granger causes HDI across different frequencies, particularly at the permanent frequency where the evidence is significant (at the 5 per cent level) and marginally at the temporary frequency (1 per cent level). However, no significant causality is found from HDI to GGI at any frequency.

Panel 3 reveals that GNIPC consistently Granger causes HDI across all frequencies, with strong evidence at the permanent frequency and marginally at the intermediate frequency. There is some evidence of causality from HDI to GNIPC at the permanent frequency, but this is not observed at intermediate or temporary frequencies.

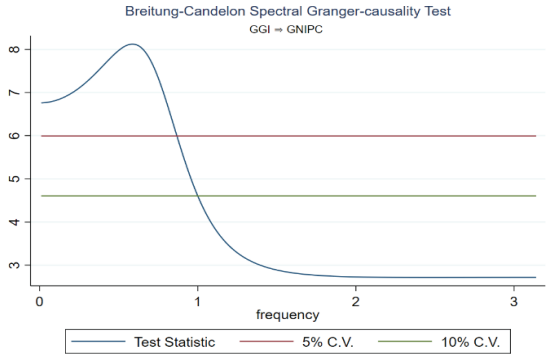
4.5. Visual representation of frequency domain causality test results

The comprehensive results are visually depicted in Figures 5 for better understanding. Figure 5 (5.1-5.3) illustrates the Wald statistics for frequencies $\omega \in [0,\pi]$ computed using the frequency domain causality test based on the Granger causality test.

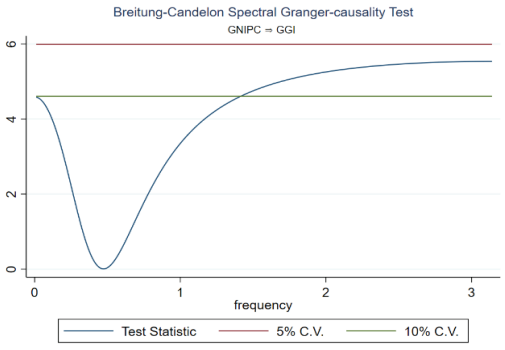
Figure 5: Results of frequency domain causality test based on the Granger causality test

5.1: GGI and GNIPC

a)

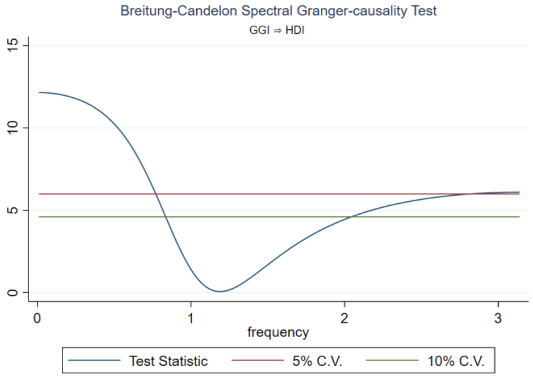


b)

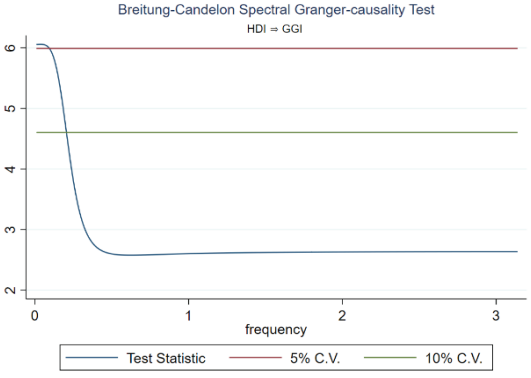


5.2: GGI and HDI

a)

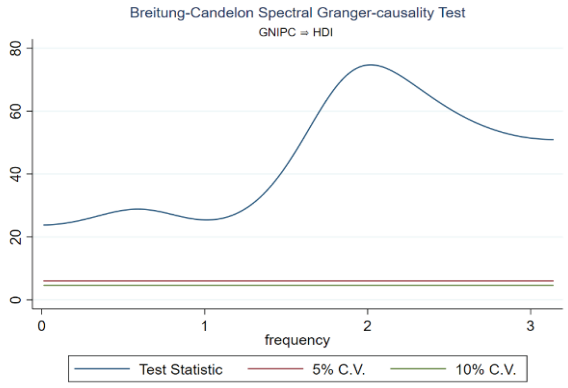


b)

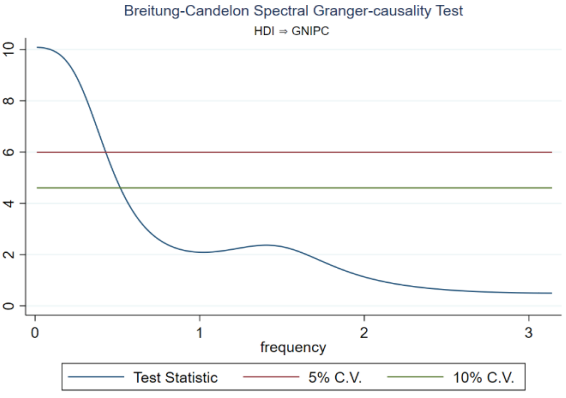


5.3: GNIPC and HDI

a)



b)



Source: Constructed by authors.

The key findings of frequency domain causality test based on visual representation of the Granger causality test can be summarised as follows: Figure 5.1(a): The test statistics for causality from GGI to GNIPC exceed the 5 per cent critical value for ω=0.5, indicating a long-run

causal relationship between these variables and in Figure 5.1(b): The test statistics for causality from GNIPC to GGI surpass the 10 per cent critical value for the frequency ranges $\omega \in [0,1.5]$ and $\omega \in [0,2.5]$, suggesting a short- and medium-run causal relationship.

Figure 5.2 (a-b): The test statistic for causality from GGI to HDI exceeds the 5 per cent critical value for the frequency ranges $\omega \in [0,0.5]$ and $\omega \in [0,2.5]$, indicating causality from GGI to HDI. There is no causal relationship from HDI to GGI, as the statistic does not exceed the 10 per cent critical value for any ω.

Figure 5.3 (a-b): A bidirectional causality between GNIPC and HDI is observed over long periods. Additionally, there is a notable unidirectional intermediate and temporary causality from GNIPC to HDI within the frequency ranges $\omega \in [0,1.0]$ and $\omega \in [0,2.5]$.

Overall, the results highlight significant causal relationships between GG, EG, and HD in various frequency domains and time frames. To conclude, GG emerges as a robust predictor of long-term EG, whereas EG positively influences GG in the short and medium run in India. The causal relationship between GGI and HDI indicates that GG serves as a reliable predictor of HD in both the short and long runs, while a high HDI does not notably affect governance in India. Lastly, EG and HD act as mutual predictors in the long run, with EG contributing to improvements in HDI.

These findings suggest that the impact of GG on EG and HD is permanent. Utilising the formula $2\pi/\omega$, we computed that a disturbance in GGI influences GNIPC and HDI for roughly 12.57 years ($2\pi/0.5$). Conversely, the effects of EG on GG are intermediate, with no obvious impact on HD. A shock in GNIPC impacts GGI for approximately 4.19 years ($2\pi/1.5$).

These findings imply that improvements in governance yield long-term economic and human development dividends, while economic performance acts more immediately to reinforce governance structures. Furthermore, the feedback loop between economic growth and human development reinforces the importance of holistic development strategies.

5. Conclusion

This study revisits the dynamic relationships between good governance, economic growth, and human development in India over the period 1996 to 2022 by employing the Breitung-Candelon frequency domain causality framework. Building upon our earlier work (Vashistha & Bishnoi, 2024), which utilized time-domain econometric methods such as Johansen Cointegration, VECM, and traditional Granger causality, the current analysis significantly advances the methodological depth by explicitly addressing a crucial limitation of the earlier approach, its inability to differentiate causal effects across different time horizons.

Time-domain tools are valuable in establishing long-run equilibrium and testing the presence of causality, but they treat relationships as temporally homogeneous, ignoring whether effects emerge quickly, persist moderately, or unfold slowly. In contrast, the frequency domain approach adopted here offers a powerful analytical advancement by decomposing causality across short, medium, and long-term horizons. This enables us to identify not only whether a causal relationship exists but also the time frame in which it is most effective, and whether it is transient or structural. The ability to capture direction, scale, and temporal specificity makes this methodology particularly suited for complex macroeconomic and institutional interactions, such as the governance–growth–development nexus.

Our findings reveal several significant insights. First, good governance emerges as a strong long-term driver of both economic growth and human development, reaffirming the critical role of effective, accountable institutions in enabling

sustainable progress. Second, economic growth significantly influences governance, but primarily over the short and medium term, likely reflecting the enabling role of rising fiscal capacity and administrative resources that accompany economic expansion. Third, good governance is shown to contribute to human development in both the short and long term, underscoring its role in ensuring effective service delivery and access to health, education, and welfare. Interestingly, human development does not exhibit significant causal effects on governance at any frequency, suggesting that improvements in education or health do not automatically result in stronger institutions unless complemented by specific governance reforms. Lastly, the relationship between economic growth and human development is mutually reinforcing, especially in the long term, confirming that social and economic outcomes are deeply interwoven over time.

These results represent a substantial refinement over our previous study. While the 2024 analysis established a long-run link among the variables, it could not specify when interventions would yield the most impact. By introducing a time-sensitive lens, the present study illustrates how policies must be sequenced according to their temporal effectiveness. Economic growth may help fund governance reforms in the near term, but institutional maturity is what sustains development in the long run. Similarly, while health and education investments yield economic benefits eventually, their governance underpinnings must be strengthened early on to maximize their reach and effectiveness.

This study offers a deeper and temporally nuanced understanding of the governance–growth–development triangle in India. It also reinforces the idea that good governance should not only accompany development, it must lead it, particularly when viewed through a long-term structural lens. The frequency domain approach allows for a more layered interpretation of macro-institutional dynamics, delivering practical guidance on how and when to intervene for maximum impact.

5.1. Policy implications

The frequency-specific findings of this study present a rich framework for designing governance and development policies that are both time-sensitive and strategically sequenced. In contrast to the broader, undifferentiated recommendations offered by the earlier time-domain study (Vashistha & Bishnoi, 2024), the present analysis enables tailored interventions aligned with short, medium, and long-run objectives.

In the short run, the results suggest that relatively modest improvements in governance, such as simplifying tax systems, reducing bureaucratic delays, and implementing user-friendly digital services, can yield measurable gains in economic performance. These "quick win" reforms, including efforts like GST simplification, online business registration, and e-governance platforms, can generate momentum, especially during electoral cycles or reform transitions. At the same time, economic growth during this period offers governments additional fiscal space, which can be strategically deployed to enhance frontline public services. Hiring and training administrative staff, such as nurses, teachers, and local inspectors, is a productive way to use this growth dividend to lay the groundwork for institutional improvement.

Over the medium term, governance reforms need transition from tactical measures to deeper structural enhancements. Strengthening regulatory bodies, institutionalizing transparency mechanisms like the RTI Act expansions, and investing in robust tax collection and service delivery systems become vital. Economic growth can support these institutional transitions by enabling innovations at the state level and providing the resources needed to scale effective governance models. In terms of human development, this is the phase when investments in service delivery, such as improved school infrastructure, better health monitoring

systems, and digitized citizen services, start producing tangible outcomes. Linking incentives for public employees to actual service outcomes (e.g., student learning levels, hospital discharge success rates) can further improve accountability.

In the long term, the role of good governance becomes foundational. The enduring effects of strong institutions, rooted in the rule of law, anti-corruption frameworks, and judicial efficiency, create a sustainable environment for both economic performance and social welfare. Governance must be embedded in macroeconomic planning, supported by independent audits and outcome-based budgeting, and continuously evaluated through transparent feedback mechanisms. Human development at this stage evolves into a self-reinforcing driver of growth. Lifelong access to healthcare, skills development tailored to future industries, and universal basic education can help create a dynamic, productive, and equitable society. Crucially, this phase requires robust systems for evaluation, civic participation, and decentralization, ensuring that development gains are sustained and widely distributed.

Comparatively, while the earlier study highlighted the need for public sector reform and long-term governance investment, it did not clarify when such reforms would be most effective. The current study fills that gap by aligning policy interventions with their temporal efficacy. For example, investments in human capital, such as vocational training and digital literacy, must be matched with governance support to ensure efficient delivery, especially in the medium term. Likewise, long-term success in areas like healthcare or environmental management depends on embedding governance indicators into core planning metrics.

In essence, this study underscores the importance of matching the scale of reform with the scale of influence. Short-term gains must be leveraged wisely to fund medium-term institutionalization, while enduring development hinges on deep-rooted governance reforms. The application of frequency domain causality enables policymakers to think beyond whether relationships exist and begin to ask more strategic questions: when do these relationships matter, how long do their effects last, and what combination of interventions yields the most sustainable outcomes?

This study confirms that good governance, economic growth, and human development are dynamically intertwined, with the strength and direction of their relationships varying across different time horizons. While economic growth can catalyze short-term institutional improvements and expand the fiscal envelope for human development, the long-term trajectory of sustainable development ultimately depends on the strength and durability of governance structures. The use of frequency domain analysis provides a novel empirical foundation for timing reforms and sequencing policies more effectively than static models allow.

Looking ahead, future research could enhance these findings by decomposing governance indicators (e.g., rule of law, corruption control, regulatory quality) or by applying wavelet-based causality techniques that integrate time and frequency analysis for even greater precision. Moreover, a regional disaggregation of the Indian dataset, analyzing differences across states and union territories, could yield critical insights into the spatial dynamics of causality, helping to tailor policy at subnational levels.

By deepening our understanding of how, when, and why governance impacts development outcomes, this study provides not only methodological innovation but also a practical blueprint for temporally coordinated governance and development policy in India.

References

Breitung, J., and Candelon, B. (2006). Testing for short- and long-run causality: A

frequency domain approach. Journal of Econometrics, 132, 363-378. https://doi.org/10.1016/j.jeconom.2005.02.004

Clive, W. J., & Lin, J. L. (1995). Causality in the long run. Econometric Theory, 11(3), 530-536.

Davis, T. J. (2016). GG as a foundation for sustainable HD in sub-Saharan Africa. Third World Quarterly, 38(3), 636-654. DOI: http://dx.doi.org/10.1080/01436597.2016.1191340

Dickey D., and Fuller W. (1979). Distribution of the Estimator for Autoregressive Time series with a Unit Root. Journal of the American Statistical Association, 74, 427-431. https://doi.org/10.1080/01621459.1979.10482531

Ding, M., Y. Chen and S.L. Bessler (2006), Granger Causality: basic Theory and Application to Neuroscience, B. Schelter, M. Winterhalder and J. Timmer (eds.) Handbook of Time Series Analysis. Wiley: 437-460.

Emara, N., and Chiu, I. (2016). The impact of governance environment on EG: The case of Middle Eastern and North African countries. Journal of Economics Library, 3(1), 24-37.

Geweke, J. (1982). Measurement of linear dependence and feedback between multiple times series. Journal of the American Statistical Association, 77, 304-313. https://doi.org/10.1080/01621459.1982.10477803

Granger, C.W.J. (1969). Investigating causal relations by econometrics models and cross-spectral methods. Econometrica, 37(3), 424-438. https://doi.org/10.2307/1912791

Hosoya, Y. (1991). The decomposition and measurement of the interdependency between second-order stationary processes. Probability Theory and Related Fields, 88, 429- 444. https://doi.org/10.1007/BF01192551

Huang, C. J. (2015). Governance and Economic Growth: Evidence of Ten Asian Countries. World Academy of Science, Engineering and Technology, International Journal of Social, Behavioral, Educational, Economic, Business and Industrial Engineering, 9(6), 2071-2075.

Huang, C. J., and Ho, Y. H. (2017). Governance and economic growth in Asia. The North American journal of economics and finance, 39, 260-272. https://doi.org/10.1016/j.najef.2016.10.010

Naskar, K., Das, S.F., and Chatterjee, T. (2023). Effectiveness of GG on human development: Empirical evidence from selected countries in the world. In Social Sector Spending, Governance, and Economic Development perspectives from across the world (Das, R.C.) Routledge, India.

Phillips, P. C. B., and Perron, P. (1988). Testing for a unit root in time series regression. Biometrika, 75(2), 335–346. DOI: https://doi.org/10.1093/biomet/75.2.335

Pradhan, R. P., and Sanyal, G. S. (2011). GG and HD: Evidence from Indian states. Journal of Social and Development Science, 1(1), 1–8.

Singh, B. P. (2019). Does governance matter? Evidence from BRICS. Global Business Review, 23(2), 408-425. DOI: https://doi.org/10.1177/0972150919861222

Tarek, B. A., and Ahmed, Z. (2013). Governance and economic performance in developing countries: An empirical study. Journal of economics studies and research, 2013, 1. DOI: http://dx.doi.org/10.5171/2013.390231

Tastan, H., 2015. Testing for spectral Granger causality. STATA Journal, 15(4), pp. 1157- 1166. https://doi.org/10.1177/1536867X1501500411

Vashistha, A., & Bishnoi, C. R. (2024). Dynamics of Good Governance, Economic Growth, and Human Development in India. Aarthika Charche, Vol. 9, No. 2.

Appendix

Theoretical Framework of the Breitung-Candelon Frequency Domain Causality Test

First, let $z_t = [x_t, y_t]'$ as a two-dimensional vector comprising time series of length t = 1,…,T. We assume that z_t follows a finite-order vector autoregression (VAR) process of order p, represented as:

$$\Theta\,(\mathrm{L})\, z_t = \varepsilon_t \quad (1)$$

Where

$$\Theta(\mathrm{L})=\begin{pmatrix}\Theta_{11}(L) & \Theta_{12}(L)\\ \Theta_{21}(L) & \Theta_{22}(L)\end{pmatrix},\ z_t=\begin{pmatrix}x_t\\ y_t\end{pmatrix},\ \varepsilon_t=\begin{pmatrix}\varepsilon 1_t\\ \varepsilon 1_t\end{pmatrix} \quad (2)$$

Where:

$\Theta\,(\mathrm{L}) = \mathrm{I} - \Theta_1 L - 6 - \Theta_p L^p$ is a 2 x 2 lag polynomial and $\Theta_1,\ 6,\ \Theta_p$ are 2 x 2 autoregressive parameter matrices, with $L^k x_t = x_{t-k}$ and $L^k y_t = y_{t-k}$. The error vector ε_t is assumed to be a white noise vector such that with $\mathrm{E}\,(\varepsilon_t) = O$ and $\mathrm{E}\,(\varepsilon_t \varepsilon_t`) = \sum$, where $\sum$, is a positive definite covariance matrix.

let G be the lower triangular matrix of the Cholesky decomposition $G`G = \sum,^{-1}$ such that $\sum(\eta_t \eta_t`) = I$ and $\eta_t = G\varepsilon_t$.

Given stationary variables, the moving average representation of the vector z_t can be articulated as follows:

$$\begin{pmatrix}x_t\\ y_t\end{pmatrix} = \Phi(\mathrm{L})\varepsilon_t = \begin{pmatrix}\Phi_{11}(L)\Phi_{12}(L)\\ \Phi_{21}(L)\Phi_{22}(L)\end{pmatrix}\begin{pmatrix}\varepsilon_{1t}\\ \varepsilon_{2t}\end{pmatrix} \quad (3)$$

$$\begin{pmatrix}x_t\\ y_t\end{pmatrix} = \Psi(\mathrm{L})\eta_t = \begin{pmatrix}\Psi_{11}(L)\Psi_{12}(L)\\ \Psi_{21}(L)\Psi_{22}(L)\end{pmatrix}\begin{pmatrix}\eta_{1t}\\ \eta_{2t}\end{pmatrix} \quad (4)$$

Where:

$\Phi(\mathrm{L})\varepsilon_t = \Phi(\mathrm{L})^{-1}$ and $\Psi(\mathrm{L}) = \Phi(\mathrm{L})\mathrm{G}^{-1}$. Utilising this representation, the spectral density of x_t can be formulated as:

$$f_x(\omega) = \frac{1}{2\pi}\left\{\left|\Psi_{11}(e^{-i\omega})^2\right| + \left|\Psi_{12}(e^{-i\omega})^2\right|\right\} \quad (5)$$

The causality test proposed by Geweke (1982) and Hosoya (1991) can be expressed as:

$$M_{y\to x}(\omega) = log\left(\frac{2\pi f_x(\omega)}{\left|\Psi_{11}(e^{-i\omega})^2\right|}\right) = log\left(1 + \frac{\left|\Psi_{12}(e^{-i\omega})^2\right|}{\left|\Psi_{11}(e^{-i\omega})^2\right|}\right) \quad (6)$$

Within this framework, if $\left|\Psi_{11}(e^{-i\omega})^2\right| = 0$, then the measures $M_{y\to x}(\omega)$ is zero. This implies that y_t does not Granger causes x_t at frequency ω. Breitung and Candelon (2006) demonstrated that y does not cause x at frequency ω if the following condition is met:

$$\left|\Theta_{12}(e^{-i\omega})\right| = \left|\sum_{k=1}^{p}\theta_{12,k}cos(k\omega) - i\sum_{k=1}^{p}\theta_{12,k}sin(k\omega)\right| = 0 \quad (7)$$

Where:

$\theta_{12,k}$ represents the (1, 2)th element of Θ_k, where a necessary and sufficient set of conditions is provided by:

$$\sum_{k=1}^{p}\theta_{12,k}cos(k\omega) = 0 and \sum_{k=1}^{p}\theta_{12,k}sin(k\omega) = 0 \quad (8)$$

Breitung and Candelon (2006) revised these constraints by reformulating the equation for x_t in the bivariate VAR model:

$$x_t = \alpha_1 x_{t-1} + 6 + \alpha_p x_{t-p} + \beta_1 x_{t-1} + 6 + \beta_p x_{t-p} + \varepsilon_{1t} \quad (9)$$

Where:

$\alpha_j = \theta_{11,j}$ and $\beta_j = \theta_{12,j}$

The null hypothesis of Granger causality from y_t to x_t at frequency ω is tested by $M_{y\to x}(\omega) = 0$, which is equivalent to the null linear restriction:

$$H_0: R(\omega)\beta = 0 \quad (10)$$

Where:

$\beta = [\beta_1, 6, \beta_p]$ and $R(\omega)$is a 2 x p restriction matrix.

$$R(\omega) = \begin{bmatrix}\cos(\omega) & \cos(2\omega) & 6 & \cos(p\omega)\\ \sin(\omega) & \sin(2\omega) & 6 & \sin(p\omega)\end{bmatrix}$$

The F-statistic is employed to test the null hypothesis within the frequency interval, $\omega \in [0, \pi]$. This test follows a F (2, T – p) distribution for each $\omega \in [0, \pi]$, where 2 is the number of restrictions, T shows the number of observations and p is the optimal lag length.

For the robustness test, we applied the VAR(p) model from the Granger (1969) causality test. Here, p represents the optimal lag length value, and d_{max} i is the maximum order of integration. This test is conducted after taking the first differences of the variables, so that variables are stationary.

Bidirectional fiscal synchronization in Karnataka: An empirical analysis

Shamna Thacha Paramban [1] and Anuraj P K[2]

Abstract

Effective fiscal management is needed for long-term economic stability, preventing unwarranted debt and fiscal imbalances. Fiscal reforms must address both expenditure management and revenue generation or focus on balancing them. This paper explores the relationship between government revenue and expenditure in Karnataka, focusing on its fiscal trajectory. Using annual data from 1980-81 to 2022-23, the study employs causality and cointegration tests to examine this nexus. The findings reveal a bidirectional relationship between government expenditure and revenue, highlighting a coordinated fiscal approach in Karnataka during the study period.

JEL Classification Codes: *C22; C32; H50; H62; E62*

1. Introduction

The sustainability of fiscal policy has been a subject of considerable attention in both academic literature and policymaking for many years, due to its critical role in ensuring financial and macroeconomic stability. In general, fiscal reforms aim at both expenditure management and revenue mobilization simultaneously, and fiscal consolidation can occur either through an increase in revenue, a decrease in expenditure, or by balancing both. Similarly, if the decision to raise revenue and increase expenditures is made simultaneously, it could have an ambiguous impact on the deficit, which reflects the discrepancy between revenue and expenditure.

Effective fiscal management is essential to achieving long-term growth, while preventing unsustainable debt levels and fiscal imbalances that may lead to economic instability. One key aspect of fiscal sustainability is the relationship between government revenue and expenditure, which has significant implications for budgetary management and fiscal outcomes. In this regard, a fiscal consolidation strategy requires an evaluation of the initial levels of revenue and expenditure, along with the temporal relationship between them. This paper examines whether revenue adjustments lead to expenditure changes, or vice versa, thereby testing the competing hypotheses of fiscal synchronization, tax-spend, and spend-tax dynamics.

2. Rationale of the study

The rationale for selecting Karnataka lies in its pioneering fiscal responsibility legislation, consistent fiscal discipline, and expenditure management, making it an ideal candidate for testing the fiscal synchronization hypothesis. While previous studies (Choudhary and Sengupta, 2009) have suggested the presence of the tax-spend hypothesis in Karnataka, we expect that a new analysis, considering a different time period and methodology, may reveal further insights. Given the state's strong fiscal performance, we hypothesize a synchronized relationship between

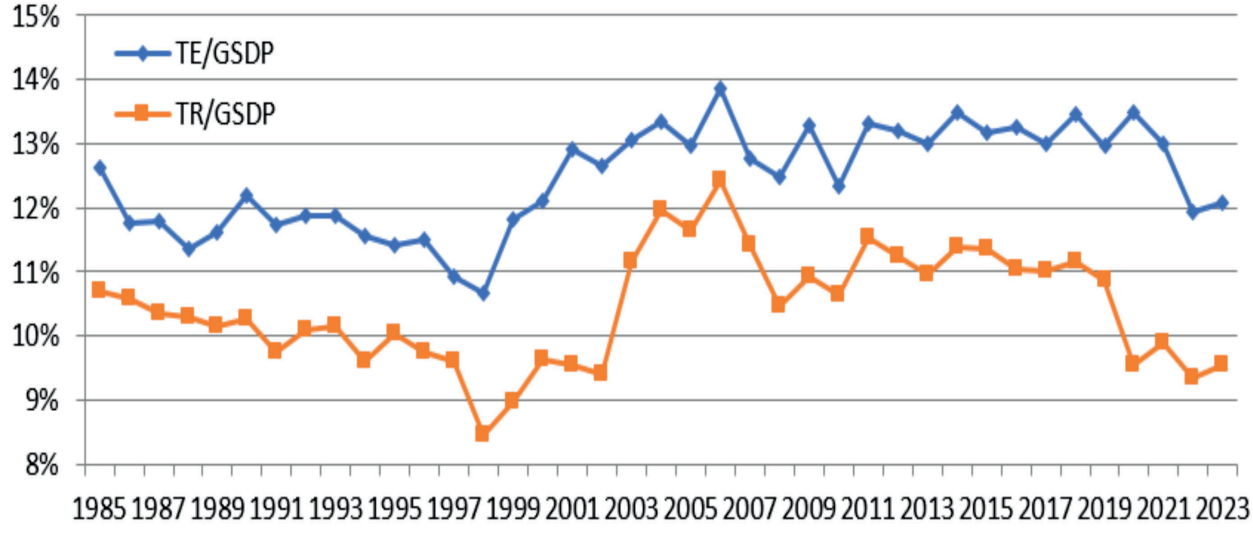
[1] *Assistant Professor, Gulati Institute of Finance and Taxation, Thiruvananthapuram, Kerala, E-mail: shamna@gift.res.in*
[2] *Research Scholar, Gulati Institute of Finance and Taxation, Thiruvananthapuram, Kerala, E-mail: anurajpk@gift.res.in*

government revenue and expenditure. This study tests the fiscal synchronization hypothesis, examining whether revenue adjustments lead to changes in expenditure or vice versa, while also considering the competing tax-spend and spend-tax dynamics. Unlike the one-way causality suggested by the tax-and-spend or spend-and-tax hypotheses, fiscal synchronization posits that revenue generation and public spending decisions are made contemporaneously to maintain fiscal balance, reflecting a coordinated fiscal policy where changes in both revenue and expenditure occur simultaneously (Musgrave, 1966).

Karnataka presents an apt case for testing these hypotheses due to its adherence to fiscal rules and disciplined financial management. The state was the first in India to enact the Karnataka Fiscal Responsibility Act (KFRA) in 2002, ahead of the central government's Fiscal Responsibility and Budget Management (FRBM) Act of 2003. The KFRA sets thresholds for key fiscal indicators, including eliminating the revenue deficit and capping the fiscal deficit at 3% of GSDP, while ensuring total liabilities do not exceed 25% of GSDP. Additionally, it mandates the preparation of a Medium-Term Fiscal Plan (MTFP) alongside the annual budget to ensure long-term fiscal sustainability (KFRA, 2002).

The state's fiscal prudence is evident from its early adoption of the MTFP for the 2000-2005 periods, based on the parameters recommended by the Eleventh Finance Commission. Karnataka met its fiscal targets by 2005, eliminating the revenue deficit and maintaining the fiscal deficit within the prescribed limits (see Figure 1 & 2). Despite temporary deviations during the 2008-09 financial crisis, when the state borrowed more to sustain public spending, Karnataka's fiscal indicators have generally remained within the KFRA limits (CAG, 2018). By 2018-19, the state had nearly eliminated its revenue deficit, with fiscal deficit and liabilities remaining below the stipulated thresholds.

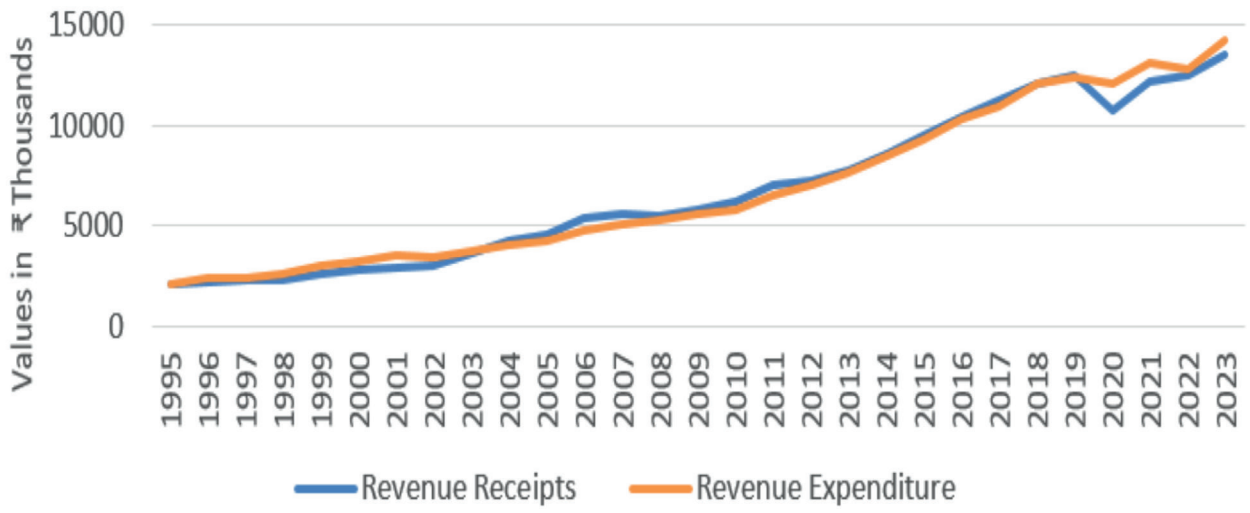
Figure 1: Share of revenue and expenditure as a percentage of state income



Source: Authors' calculations based on data from RBI State Finances.

Note : TE=Total Expenditure, TR=Total Revenue receipts and GSDP=Gross State Domestic Product.

Figure 2: Trends in revenue expenditure and revenue receipts, Karnataka



Source: Authors' calculations based on data from RBI State Finances.

The state's ability to maintain a surplus on the revenue account, except in the last years, along with its consistent fiscal performance, particularly after 2004, suggest a well-coordinated relationship between revenue and expenditure decisions. Given the state's surplus on the revenue account, particularly after 2004, and its consistent fiscal management, we hypothesize that a synchronized relationship between revenue and expenditure exists. This assumption is further supported by the state's adherence to fiscal consolidation and prudent debt management practices, as outlined in its fiscal responsibility legislation. In this context, our study tests whether Karnataka's fiscal data supports the fiscal synchronization hypothesis or others.

3. Revenue–expenditure nexus

3.1. Established hypotheses

The examination of this issue is not surprising because the direction of causality has important implications for the budget deficit of a country. The causal relationship between revenues and expenditures has attracted the attention of researchers in the field and has been the subject of several empirical papers. Theoretically, there are four different propositions regarding the revenue-expenditure relationship. The tax-and-spend hypothesis (Friedman, Buchanan, and Wagner, 1978) argues that there is a positive causal relationship between public revenue and expenditure, with the government adjusting expenditures to the level of revenues, so that control of taxation is essential to limiting growth in government expenditure. The spend-and-tax hypothesis of Peacock and Wiseman (1961; 1979) advocates that expenditures cause revenue, suggesting that a temporary increase in government expenditures in response to crises will lead to higher permanent taxes. That is, higher expenditures would lead to higher taxes. At the same time, the fiscal synchronization hypothesis argues that governments may concurrently change expenditures and taxes (Meltzer and Richard, 1981; Musgrave, 1966). Empirically, this hypothesis is characterized by contemporaneous feedback or bidirectional causality between government revenues and government expenditures.

Although the tax-and-spend, spend-and-tax, and fiscal synchronization hypotheses are easy to distinguish from one another, different studies on

the same country led to different conclusions. The Institutional Separation Hypothesis (Baghestani and McNown, 1994) suggests that revenues and expenditures are independent of one another, meaning the decisions on taxation are made independently from the allocation of government expenditures. The government decides separately about spending and revenues, so there is no long-term relationship between government spending and revenues. The endogenous growth models suggest that the government's tax and expenditure policies can affect steady-state growth rates in either direction. In general, a change in deficits is attributed to changes in government spending, revenue, or both, or to the growth performance of a state.

3.2. Empirical evidences

The empirical findings on the relationship between government expenditure and revenue in India reveal a diverse range of findings across different states, affected by the time period considered and the methodology used. Nithin (2015) shows that most Indian states support the tax-spend hypothesis, where revenue generation precedes government expenditure. Akram and Rath (2019) offered a different perspective, suggesting fiscal synchronization across 26 Indian states from 1980 to 2014 using the Dumitrescu–Hurlin panel causality test, highlighting the multifaceted nature of fiscal dynamics. State-level studies present further complexities. Dhanasekaran (2001), using Granger causality tests, identified support for the spend-and-tax hypothesis, where government expenditure drives subsequent revenue collection. In Karnataka, Chaudhuri and Sengupta (2009) observed characteristics of the tax-spend hypothesis, while in Tamil Nadu, no significant causal relationship was found, indicating an institutionally coupled relationship. In Kerala, Shamna (2023) noted weak evidence for a clear causal link, suggesting that the relationship between revenue and expenditure may not be robust in the state. Other state-specific studies show similar diversity. Mannem (2014) found support for the tax-spend hypothesis in Odisha, and Vadalamannathi and Veena (2007) identified similar patterns in Andhra Pradesh. Recent studies, including those by Mohanty and Mishra (2017), Meher (2020), and Pujari and Biradar (2022), provide additional evidence reinforcing the tax-spend hypothesis in various Indian states. Overall, these findings highlight the complexity of fiscal dynamics in India and the need for further research to better understand the interplay between government revenue and expenditure across states.

Recently, NITI Aayog's Fiscal Health Index (FHI) ranked Karnataka in the category of fiscal forerunners, with an overall position of 10th in 2022–23, marking a significant decline from its earlier rank of 4th in 2020–21. In the sub-indices, Karnataka ranked 7th in fiscal prudence, 5th in the quality of expenditure, and 10th in revenue mobilisation. The state's overall rank affected by its performance on the debt sustainability indicator, where it ranked 16th out of 18 states, one of the lowest among all major states. The index measures debt sustainability by calculating the gap between the Gross State Domestic Product (GSDP) growth rate and the growth rate of interest payments. While this indicator may offer insight into short-term fiscal stress, it fails to capture the more comprehensive dimension of long-term debt sustainability. Notably Domar's condition (1944), debt is considered sustainable when the real income growth rate exceeds the real interest rate (i.e., $y - r > 0$). The NITI Aayog methodology, which uses the growth rate of interest payments without adjusting for the stock of outstanding debt or the real interest burden, presents a limited assessment.

Contrary to the index's debt sustainability score, Karnataka performs relatively better in conventional debt indicators, such as the ratio of interest payments to revenue receipts and outstanding liabilities to GSDP, when compared to higher-ranked states. These ratios suggest that Karnataka's debt profile is not structurally unsustainable. The inconsistency between NITI Aayog's ranking and the state's actual

fiscal indicators points to the need for a broader evaluative framework one that incorporates effective interest burden (i.e., interest payments as a share of the previous year's outstanding debt), the primary revenue balance, and the relative growth of GDP and debt stock. While, the Fiscal Health Index offers a snapshot of short-term fiscal pressure, it falls short as a comprehensive measure of debt sustainability. A more nuanced understanding of Karnataka's fiscal position must consider both immediate fiscal indicators and long-term structural dynamics.

4. Data and methodology

This study uses data covering the period from 1980–1981 to 2022–2023 in two ways. First, we converted the data into real terms using the 2011–12 base year. Second, we examined the ratios of total expenditure (TE) to total revenue (TR). Because the results might be influenced by the time period considered, we also performed a separate analysis focusing on the post-FRBM (Fiscal Responsibility and Budget Management) period.

Since the series for government expenditure and revenues are found to be integrated of order one, I (1), we attempted to test whether there exists a long-run equilibrating relationship between them. This test is based on the assumption that the error correction mechanism would push government finances toward the levels required by the inter-temporal budget constraint. To assess this, we applied the cointegration methodology of Johansen (1988, 1991) and Johansen and Juselius (1990), and our study determines optimum lag lengths using Schwarz Bayesian criterion (BIC). The null hypothesis of the Johansen - Juselius cointegration test is that there are at most r cointegrating relationships among the variables under consideration. Table 1 presents the results.

Initially, we examined the relationship between expenditure and revenue, noted as Revenue Receipts (RR), States' Own Revenue (SOR), which includes both own tax and non-tax revenue, and Revenue Expenditure (RE), perceiving that most previous studies have focused on the connection between revenue expenditure and revenue receipts. Since we couldn't find a significant relationship between these two, we extended our analysis by testing different combinations. When no statistically significant relationship was found between various fiscal components—including revenue expenditure, state's own revenue, capital outlay, and revenue receipts, we tested additional sets of variables, including Revenue Expenditure excluding Interest Payments (REIP), Revenue Expenditure excluding both Interest Payments and Administrative Services. In addition, we tested the presence of Capital Outlay (CO) and Developmental Expenditure (DE), assuming these factors play a role when paired with Revenue Receipts (RR). By incorporating these additional variables, we aimed to capture a broader view of the relationship between expenditure and revenue, which might have been disregarded in previous analyses focused solely on revenue expenditure and revenue receipts.

Table 1: Cointegration test results

H_0	RR – RE	SOR – RE	RR – REIP	SOR – DE	SOR – REIPAS	RR – CO	SOR-CO
Trace Test							
H_0: r = 0	8.3776 (0.4332)	9.5195 (0.3254)	12.061 (0.1555)	14.454 (0.0702)	12.693 (0.1271)	14.513 (0.0687)	13.515 (0.0969)
H_0: r = 1	0.16329 (0.6861)	0.0058847 (0.9389)	0.12226 (0.7266)	0.00020320 (0.9886)	0.00038699 (0.9843)	0.028822 (0.8652)	0.018585 (0.8916)

H_0	RR – RE	SOR – RE	RR – REIP	SOR – DE	SOR – REIPAS	RR – CO	SOR-CO
Lmax Test							
H_0: r = 0	8.2143 (0.3655)	9.5136 (0.2513)	11.938 (0.1132)	14.453 (0.0447)	12.693 (0.0865)	14.484 (0.0441)	13.496 (0.0643)
H_0: r = 1	0.16329 (0.6862)	0.0058847 (0.9389)	0.12226 (0.7266)	0.00020320 (0.9886)	0.00038699 (0.9843)	0.028822 (0.8652)	0.018585 (0.8916)

Source: Authors' calculations based on data from RBI State Finances.

Our initial analysis on cointegrating relationship between expenditures and revenues was not in favour of long run equilibrating relationship for the concerned time period. Thus, the Granger causality framework is used to examine the dependency between expenditures and revenues after taking the first- difference of the data. That is, whether expenditure Granger causes revenue or revenue Granger causes expenditure. We used different combination of revenue and expenditures based on the result of initial analysis.

The testable models are represented as follows;

$$\Delta Y_t = \alpha + \sum_{i=1}^{P} \beta \, \Delta Y_{t-i} + \sum_{i=1}^{P} \gamma \Delta x_{t-i} + \varepsilon_t \quad (1)$$

$$\Delta X_t = \alpha + \sum_{i=1}^{P} \beta \, \Delta X_{t-i} + \sum_{i=1}^{P} \gamma \, \Delta Y_{t-i} + \varepsilon_t \quad (2)$$

For example, when the null hypothesis is RE does not Granger cause RR, the testable model is;

$$\Delta Rr_t = \alpha + \sum_{i=1}^{P} \beta \, \Delta Rr_{t-i} + \sum_{i=1}^{P} \gamma \, \Delta Re_{t-i} + \varepsilon_t \quad (3)$$

Here, Δ denotes first differences, and P represents lag length. The coefficients α, β, and γ are coefficients to be estimated in the model. The null hypothesis in each equation posits that the lagged differences of the independent variable (e.g., Xt in the first equation) do not significantly influence the dependent variable's change (e.g., Yt). Rejection of the null indicates that past values of one variable help predict changes in the other, implying short-run Granger causality. For example, when the null hypothesis is that revenue expenditure (RE) does not Granger cause revenue receipts (RR), the test involves examining whether past changes in RE significantly explain current changes in RR, controlling for RR's own past values. If the null is rejected, it indicates that changes in RE have predictive power over RR in the short run, suggesting a causal linkage from expenditure to revenue.

5. Results and discussion

Table 2 presents the Granger causality test results based on a two-way approach: first, by examining different combinations of revenue and expenditure components; and second, by analysing the same relationships as a proportion of total revenue and total expenditure. The analysis initially reveals no significant causality between states' own revenue and total revenue expenditure, suggesting that overall spending does not dynamically respond to states' revenue-generating capacity, nor does revenue generation respond to aggregate expenditure trends. However, when revenue expenditure is disaggregated by excluding interest payments and administrative services, typically considered non-developmental and committed expenditures, at 10% significance level, a bidirectional causality is detected: states' own revenue Granger-causes development-focused expenditure, and the latter, in turn, Granger-causes own revenue. This finding points to a productive and responsive fiscal relationship, where development-oriented spending connects with revenue mobilization, possibly through enhanced economic activity or institutional efficiency.

Table 2: Granger causality test results

Relationship	Test-Statistic and Inference
Revenue Receipts Granger-causes Revenue Expenditure	0.129912 (0.3841) No
Revenue Expenditure Granger-causes Revenue Receipts	−0.0748999 (0.70280) No
States' Own Revenue Granger-causes Revenue Expenditure	0.161695 (0.2480) No
Revenue Expenditure Granger-causes States' Own Revenue	−0.328489 (0.0705) * Yes
States' Own Revenue Granger-causes Revenue Expenditure excluding Interest Payments and Administrative Services	0.267150 (0.1000) * Yes
Revenue Expenditure excluding Interest Payments and Administrative Services Granger-causes States' Own Revenue	−0.308834 (0.0548) * Yes

Source: Authors' calculations based on data from RBI State Finances.
Note: *Significant at 10% level.

The second layer of analysis, reported in Table 3, considers the same variables expressed as proportions of total revenue and total expenditure. Under this specification, the results exhibit statistically significant evidence of bidirectional causality: revenue receipts Granger-cause revenue expenditure at the 1% level ($p < 0.01$), while expenditure Granger-causes receipts at the 5% level ($p < 0.05$). This proportional analysis captures the synchronization of fiscal flows relative to overall budget size[3].

Table 3: Granger causality test results –as a percentage of TE and TR

Relationship	Test-Statistic and Inference
Revenue Receipts Granger-causes Revenue Expenditure	0.112075 (0.0057) *** Yes
Revenue Expenditure Granger-causes Revenue Receipts	-1.17376 (0.0448) ** Yes

Source: Author's calculations based on data from RBI State Finances.
Note: *** (or **) Significant at 1 (or 5) % level.

6. Conclusion and implications

This study examines the relationship between government expenditure and revenue in Karnataka. The findings reveal bidirectional causality, supporting the fiscal synchronization hypothesis. Unlike the earlier study by Choudhary and Sengupta (2009), which identified a one-way tax-spend relationship, this analysis based on the ratio of total expenditure to total revenue indicates a balanced interaction, where both revenue and expenditure influence each other over the examined period. This suggests that Karnataka's fiscal policies are aligned, with revenue and expenditure adjustments occurring in tandem, contributing to fiscal stability.

[3] The result reflects when taken as a ratio of total expenditure to total revenue. While the study by Choudhary and Sengupta demonstrates (2009) the tax-spend hypothesis for Karnataka during the 1980-2005 period, we couldn't find such a strong Granger causality relationship (Table.2). But, when we analyzed the data using the ratio of total expenditure (TE) to total revenue (TR), we found a stronger causality between revenue expenditure (RE) and revenue receipts (RR) for Karnataka supporting fiscal synchronization hypothesis (Table 3). Since the results may have been affected by the time period considered, we also conducted a separate analysis focusing on the post-FRBM (Fiscal Responsibility and Budget Management) period. Interestingly, the test results remained consistent with those for the whole period.

The results highlight the importance of fiscal discipline and provide valuable insights into the sustainability of Karnataka's fiscal policy. They imply that revenue and expenditure decisions in the state have been made in a coordinated manner, reflecting a deliberate and synchronized approach to fiscal management. These findings contribute to the broader discourse on fiscal policy design, particularly in the context of state-level fiscal management in India, and underscore the need for integrated revenue-expenditure planning to ensure long-term fiscal health.

References

Akram, V., & Rath, B. N. (2019). Is there any evidence of tax-and-spend, spend-and-tax or fiscal synchronization from a panel of Indian states? Applied Economics Letters, 26(18), 1544–1547.

Anderson, W., Wallace, M. S., & Warner, J. T. (1986). Government spending and taxation: What causes what? Southern Economic Journal, 63, 630–639.

Baghestani, H., & McNown, R. (1994). Do revenues or expenditures respond to budgetary disequilibria? Southern Economic Journal, 60, 311–322.

Bhat, K. S., Nirmala, V., & Kamaiah, B. (1993). Causality between tax revenue and expenditure of Indian states. The Indian Economic Journal, 40(4), 108–117. https://doi.org/10.1177/0019466219930411

Bohn, H. (1991). Budget balance through revenue or spending adjustments? Some historical evidence for the United States. Journal of Monetary Economics, 27(3), 333–359.

Buchanan, J. M., & Wagner, R. E. (1977). Democracy in deficit: The political legacy of Lord Keynes. Academic Press.

Chang, T., Liu, W. R., & Caudill, S. B. (2002). Tax-and-spend, spend-and-tax, or fiscal synchronization: New evidence for ten countries. Applied Economics, 34(12), 1553–1561. https://doi.org/10.1080/00036840110103265

Chaudhuri, K., & Sengupta, B. (2009). Revenue–expenditure nexus for Southern States: Some policy oriented econometric observations (Working Paper No. 48). Madras School of Economics. https://www.mse.ac.in/wp-content/uploads/2021/05/working-paper-48.pdf

Dhanasekaran, K. (2001). Government tax revenue, expenditure and causality: The experience of India. Indian Economic Review, 36(2), 359–379. http://www.jstor.org/stable/29794248

Friedman, M. (1978, Summer). The limitation of tax limitation. Policy Review, 7–14.

Hoover, K. D., & Sheffrin, S. M. (1992). Causation, spending, and taxes: Sand in the sandbox or tax collector for the welfare state? The American Economic Review, 82(2), 225–248.

Jones, J. D., & Joulfaian, D. (1991). Federal government expenditures and revenues in the early years of the American republic: Evidence from 1792 to 1860. Journal of Macroeconomics, 13(1), 133–155.

Manage, N., & Marlow, M. L. (1986). The causal relation between federal expenditures and receipts. Southern Economic Journal, 63, 617–629.

Meher, S. (2020). Dynamic causal relationship between government expenditure and revenue in Odisha: A trivariate analysis (Working Paper No. 78). Nabakrushna Choudhury Centre for Development Studies. https://www.ncds.nic.in/sites/default/files/WorkingandOccasionalPapers/WP78NCDS.pdf

Meltzer, A. H., & Richard, S. F. (1981). A rational theory of the size of government. Journal of Political Economy, 89(5), 914–927.

Miller, S. M., & Russek, F. S. (1990). Co-integration and error-correction models: The temporal causality between government taxes and spending. Southern Economic Journal, 76(3), 221–229.

Mohanty, A. R., & Mishra, B. R. (2017). Cointegration between government expenditure and revenue: Evidence from India. Advances in Economics and Business, 5(1), 33–40. https://doi.org/10.13189/aeb.2017.050105

Musgrave, R. (1966). Principles of budget determination. Public finance: Selected readings, 15-27.

Nithin, K. (2015). Fiscal reaction function: Panel evidence from Indian states. Global Business and Economic `Research Journal.

Owoye, O. (1995). The causal relationship between taxes and expenditures in the G7 countries: Cointegration and error-correction models. Applied Economics Letters, 2(1), 19–22.

Peacock, A. T., & Wiseman, J. (1979). Approaches to the analysis of government expenditure growth. Public Finance Quarterly, 7(1), 3–23.

Pujari, D., & Biradar, R. R. (2022). Tax-spend hypothesis: Evidence and policy implications for India. Aarthika Charche, 7(2).

Ram, R. (1988). Additional evidence on causality between government revenue and government expenditure. Southern Economic Journal, 54, 763–769.

Reserve Bank of India. (n.d.). State finances: A study of budgets.

Thachaparamban, S. (2023). Revenue–expenditure nexus: Case of Kerala. Kerala Economy, 4(4), 51–56.https://www.gift.res.in/wp-content/uploads/2024/06/Revenue-expenditure_nexus_Case_of_Kerala_Shamna_Thachaparamban1.pdf

State budget announcements for climate action: A comparative analysis of 2025-26 budgets of nine Indian states

Ashok Rao [1] and Apoorva Chandra [2]

Abstract

India's commitment to climate action is evident from its Nationally Determined Contributions (NDCs) and Net Zero target by 2070. While national frameworks like the National Action Plan on Climate Change (NAPCC) and National Adaptation Plan (NAP) guide national-level climate action, states play a crucial role in building resilience and enabling low-carbon transitions. The annual state budget is an important fiscal tool to allocate resources for climate action. This article presents findings from a keyword-based analysis of the 2025–26 budget speeches of nine Indian states. It covers 40 climate-related announcements under four themes: climate policy, institutions for climate action, climate-focused programs and schemes, and climate-resilient infrastructure. The findings indicate a growing integration of climate priorities into state budgets. However, variations exist in the manner climate actions are presented, their detailing, and inclusion of performance information. The article recommends the adoption of "green budgeting" to systematically integrate climate considerations into public financial management.

JEL Classification Codes: *H760, Q540, Q580*

1. Introduction

India has announced its commitment to achieve Net Zero carbon emissions by 2070[3] and has put forth its climate ambitions in its Nationally Determined Contributions (NDCs)[4]. The country is making steady progress toward this goal, including a significant expansion in renewable energy capacity and development of policy frameworks such as the National Action Plan on Climate Change (NAPCC), the National Adaptation Plan (NAP), and more recently a consultation draft framework of India's Climate Finance Taxonomy. While these frameworks set the direction at the national level, states play a critical role in transforming these goals into action. Through their State Action Plans on Climate Change (SAPCCs) and programs, states are playing their part in building climate resilience and enabling low-carbon growth.

In this context, annual state budgets stand out as powerful fiscal policy instruments—offering a window into the state governments' climate priorities and a mechanism to fund their climate actions. This article presents key findings from a comparative analysis of climate-related announcements in the 2025–26 annual budget speeches of nine Indian states (Andhra Pradesh, Arunachal Pradesh, Assam, Delhi, Gujarat,

[1] Practicing Chartered Accountant and Executive Director, MaGC (Management and Governance Consulting Pvt. Ltd.), No. 253, 1st A Main, AMS Layout, Vidyaranyapura, Bengaluru – 560097, E-mail: ashok@magc.in

[2] Consultant, MaGC (Management and Governance Consulting Pvt. Ltd.), 'Guru Kripa', #575/A, 75th 'C' Cross, 6th Block, Rajajinagar, Bengaluru – 560010, E-mail: apoorva.c@magc.in

[3] Press Information Bureau, India's Commitment under Panchamrit at COP26 – Summary, November 3, 2021, https://www.pib.gov.in/PressReleasePage.aspx?PRID=1795071.

[4] India submitted its updated NDCs in August 2022 and is due to submit its next update in 2025. United Nations Framework Convention on Climate Change (UNFCCC), NDC Registry – India, accessed May 20, 2025, https://unfccc.int/NDCREG.

Karnataka, Odisha, Rajasthan, and Tamil Nadu), highlighting emerging trends, innovations, and areas for improvement.

2. Methodology

The objective of the analysis is to understand how state governments are using their annual budgets to drive climate action. The nine study states were selected based on the geographic spread, population, and past incidence of extreme weather events such as heavy rainfall, floods, cyclones, heatwaves, and droughts.

As a first step, a keyword search was performed on each budget speech for words commonly associated with climate change or climate action. This included words like 'climate', 'mitigation,' adaptation', 'green', 'environment', pollution', 'disaster', 'carbon', and 'renewable'. Relevant paragraphs mentioning the keywords were extracted for further analysis. Generic mentions of keywords without associated budget announcement or financial allocation were excluded. Unrelated mentions (for instance, "green" used for "green corridor" or "climate" used in "conducive climate" without environmental or climate context) were also excluded.

For each relevant mention, details such as the state, the climate announcement, and budgetary allocation (where specified) were tabulated. Further, each budget announcement was identified with the type of climate action it supported (mitigation or adaptation).[5] A deeper analysis enabled the announcements to be grouped under four themes, namely:

1. Climate Policy
2. Institutions for Climate Action
3. Programs and Schemes with Climate Focus
4. Climate-resilient Infrastructure

Our analysis is subject to few limitations. First, variations in detailing and presentation of the budget speeches may have affected the information available for analysis. Second, the analysis is confined to information mentioned in the 2025–26 budget speech, thereby excluding climate policies and actions not reflected in these announcements. Third, the focus on a single fiscal year excludes continuing initiatives from prior years (unless specifically called out in the 2025-26 budget speech) or broader long-term policy trends not mentioned in the budget speech.

3. Findings

3.1. Climate policy

While multiple states have announced specific policy measures towards climate action, the ambition level and clarity of such policy announcements in the budget varies from state to state.

Tamil Nadu has announced that it will put in place an 'Integrated Renewable Energy Policy' to consolidate existing policies for promotion of renewable energy in the state.[6] Andhra Pradesh (AP) has also announced a push under the 'AP Integrated Clean Energy Policy 2024' to make the state a Green Hydrogen Hub.[7]

The Odisha Government proposes 'enhanced incentives' across all electric vehicle (EV) segments under the 'Green Odisha EV Policy'[8] to achieve 20% of total vehicle registrations, without

[5] *Mitigation actions aim to reduce or prevent greenhouse gas (GHG) emissions, thereby limiting the extent and pace of long-term climate change. Adaptation actions are measures taken to adjust to the current or expected impacts of climate change.*

[6] *Finance Department, Tamil Nadu, Budget Speech 2025–26, 2025, https://cms.tn.gov.in/cms_migrated/document/docfiles/budget_speech_e_2025_2026.pdf*

[7] *Finance Department, Andhra Pradesh, Budget Speech 2025–26, 2025, https://apfinance.gov.in/...Bud@et25-26/documents/SpeechEnglish.pdf*

[8] *Finance Department, Odisha, General Budget Speech 2025–26 (Part II), 2025, https://finance.odisha.gov.in/sites/default/files/2025-02/Part-II%20General%20Budget%20Speech%202025-26_Eng.pdf*

mentioning the amount allocated towards these incentives.[9] In contrast, Karnataka's proposed 'Clean Mobility Policy 2025–30' reflects a more concrete and ambitious approach.[10] It not only aims to accelerate EV adoption but also positions clean mobility as an economic opportunity by seeking Rs.50,000 crore in investment and the creation of one lakh jobs by developing a state-wide cluster-based clean mobility value chain. Rajasthan's budget introduces a 'Vehicle Scrap Policy' that bans all vehicles older than 15 years[11], effectively removing the difference in treatment of private and commercial vehicles.[12]

Assam's budget speech[13] reinforces the state's commitment to adopt emerging market-based financing mechanisms like carbon credit trading - the announcement of a "Carbon Credit Framework" builds on prior actions which include a Memorandum of Understanding (MoU) with NABARD Consultancy Services (NABCONS) to develop and operationalise the framework.[14] Similarly, Karnataka's proposed 'Agro-forestry and Carbon Credit Policy' in State Budget 2025-26 reflects a strategic move to align agriculture and forestry with climate goals. By promoting high carbon-retaining tree species on farmland, it aims to boost farmer incomes while enhancing carbon sequestration-supporting mitigation and tapping into emerging carbon markets.

3.2. Institutions and climate action

In addition to an enabling policy environment, institutions that can anchor and drive large-scale climate action are necessary. States have been establishing new institutions to spearhead their climate action efforts.

Tamil Nadu's 2025-26 budget places institutional development at the core of its climate strategy – it has announced the establishment of a Basic Sciences and Mathematics Institute for research and solutions on emerging challenges like global warming, climate change, and renewable energy storage, a Marine Resource Foundation to promote sustainable practices such as mangrove conservation and modern fishing, and a State Institute of Disaster Management to improve disaster management capacities in the state. Karnataka's budget proposes the creation of the Karnataka Forest, Wildlife and Climate Change Mitigation Foundation to channel Corporate Social Responsibility (CSR) contributions toward climate initiatives—a first-of-its-kind mechanism in India. The state has also announced the formation of an expert committee to re-delineate agro-climatic zones—last revised several decades ago—signaling a proactive approach to climate-resilient agricultural planning.

Arunachal Pradesh has also taken a significant step by signing an MoU under the CITIIS 2.0

---

[9] The Odisha Electric Vehicle Policy, 2021 provided incentives for all vehicle categories, with a maximum subsidy of ₹50,000 for four-wheelers. In 2023, the incentive structure was revised, increasing the maximum subsidy to ₹1.5 lakh to boost EV adoption. The original policy and its subsequent amendments can be accessed here: https://ct.odisha.gov.in/sites/default/files/2023-07/EV%20Policy%20-%202021%28Amended%202023%29_0.pdf

[10] Finance Department, Karnataka, Budget Speech 2025–26, 2025, https://finance.karnataka.gov.in/uploads/media_to_upload1741332694.pdf

[11] Point no. 6 under paragraph 129 of the budget speech states that the policy prohibits the use of 'vehicles' over 15 years. This has been assumed to mean a general ban on both types of vehicles – private and commercial.

[12] The Government of India rules in this regard still makes the distinction between commercial (transport) and private (non-transport) vehicles: Press Information Bureau, Road Transport & Highways Minister, Shri Nitin Gadkari Announces Vehicle Scrapping Policy, March 18, 2021, https://www.pib.gov.in/Pressreleaseshare.aspx?PRID=1705811

[13] Finance Department, Assam, Budget Speech 2025–26, 2025, https://finance.assam.gov.in/portlets/assam-budget-2025-26.

[14] NABCONS, Event Archive, accessed May 20, 2025, https://www.nabcons.com/media/event_details/11/archive

program[15] to establish a State Climate Centre for Cities, which will enhance evidence-based urban climate planning.[16] Assam has also announced the setting up of a Climate Centre with interactive displays to educate citizens on environmental sustainability.

3.3. Programs and schemes with climate focus

State governments are increasingly implementing climate initiatives through their own schemes, while also leveraging financial and investment support from the Union Government.

Karnataka has proposed the induction of over 14,000 electric buses—up from just over 700 in 2024-25—under the Union Government's PM e-DRIVE and PM-eBus Sewa schemes.[17] These policy initiatives not only allow the state to access central incentives but also encourage private sector participation through the Payment Security Mechanism (under PM-eBus Sewa), which ensures timely payments to bus operators. Tamil Nadu has also announced a move from diesel to CNG buses.

As part of its first Green Budget, the Rajasthan government has introduced several new initiatives, including the 'Rajasthan Circular Economy Incentive Scheme – 2025'.[18] The scheme offers a Rs.2 crore grant for research and development in recycling and reuse technologies and provides an additional 0.5% interest rebate on loans for micro, small and medium enterprises (MSMEs) and startups in the circular economy sector.

Assam and Odisha are turning to technology, particularly Artificial Intelligence (AI), to address climate-related challenges. Assam's 'Vision for Future Assam' identifies AI and data-driven climate-smart agriculture as a key strategy for rural prosperity beginning in 2025–26—highlighting the growing intersection of innovation, sustainability, and development. Odisha's AI Mission also aims to position the state as a national AI hub, with applications extending to climate change among other sectors.

Furthering their focus on the marine system, Tamil Nadu and Odisha have announced measures to obtain blue flag certification[19] for their beaches, in addition to providing large allocations for expanding green cover in the state.

Gujarat has announced a Climate Change Fund to promote green technology and address climate change-related issues in the state.[20]

3.4. Climate-resilient infrastructure

In addition to introducing climate-considerations in infrastructure projects across sectors, States are making targeted budget allocations towards developing climate-resilient infrastructure—to better withstand climate-induced weather events (adaptation) and support the transition to low-carbon systems (mitigation).

Karnataka has allocated Rs.3,000 crore to build a comprehensive drainage network and sewage treatment plants in Bengaluru to mitigate urban flooding. The state also proposes to develop

[15] *National Institute of Urban Affairs (NIUA), City Investments to Innovate, Integrate and Sustain (CITIIS), accessed May 20, 2025, https://citiis.niua.in/*

[16] *Finance Department, Arunachal Pradesh, Budget Speech 2025–26, 2025, https://www.arunachalbudget.in/docs/speech1.pdf*

[17] *About PM e-Drive and PM e-Bus Sewa schemes: Press Information Bureau, Implementation of E-Buses Scheme, December 6, 2024, https://www.pib.gov.in/PressReleaseIframePage.aspx?PRID=2081560*

[18] *Finance Department, Rajasthan, Budget Speech 2025–26, 2025, https://finance.rajasthan.gov.in/docs/budget/statebudget/2025-2026/BudgetSpeech202526.pdf*

[19] *An international eco-label awarded to beaches, marinas, and sustainable boating tourism operators that meet high environmental and quality standards.*

[20] *Finance Department, Gujarat, Budget Speech 2025–26, 2025, https://financedepartment.gujarat.gov.in/Budget-speech.html*

a public-private-partnership (PPP) model for facilitating earnings from biogas and carbon credits from waste generated in sewage treatment. Addressing the persistent issue of cleaning of river[21] Yamuna, Delhi has announced the establishment of 40 decentralised sewage treatment plants to prevent sewage water from entering the river. Tamil Nadu has proposed building new reservoirs to tackle its prolonged water problems and other innovative solutions such as constructing 'sponge parks' across the Chennai Metropolitan Area to improve flood resilience and enhance groundwater recharge.

On the mitigation front, Gujarat has announced budgetary support for solar rooftop systems on government buildings and a new renewable energy park to expand clean energy adoption. It has also made allocations for climate-resilient roads and bridges. Tamil Nadu budget proposes a 4,000 Megawatt-hour battery energy storage system that will support the transition to renewable energy sources to meet its increasing electricity demand.

With support from the Smart Cities Mission, Tamil Nadu and Rajasthan are building eco-cities focused on low-carbon growth, efficient resource use, and climate resilience. Tamil Nadu is planning integrated cities with green energy systems, while Rajasthan's 'waste-to-wealth parks' promote circular economy solutions. These reflect a shift toward sustainable urban development.

Meanwhile, Assam is prioritising green innovation by proposing the development of India's first 'bamboo city' using low-emission construction materials for government buildings, and establishing a 'green packaging industrial hub' dedicated to sustainable packaging technologies like bioplastics and banana fiber-based alternatives.

4. Findings and Insights

Within the larger canvas of climate action, the focus areas differ from state to state. The extent of detailing of climate-related measures in the budget speech also differs. Nevertheless, the announcements clearly indicate that states place climate change and climate action among their top development priorities and are willing to commit significant budget allocations towards climate action. Major findings from the analysis are given below.

4.1. Keyword mentions[22] : Although not a sole indicator of the emphasis (or its absence) on climate action, a keyword analysis throws some interesting insights. Table 1 shows the distribution of the occurrence of keywords. The maximum occurrence of climate-relevant keywords is in the budget speech of Tamil Nadu. Eight of the nine state budget speeches mention the word 'climate' at least once, with the word appearing five or more times in the speeches of Assam, Gujarat, Karnataka, and Odisha. 'Green' and 'environment' seem to be more commonly used, given their occurrence in all nine budget speeches, and with 'green' used ten times or more in the budget speeches of Gujarat and Rajasthan. One can find the highest mentions of 'disaster' in the budget speech of Odisha (nine times), which is not surprising given the vulnerability of the state to cyclones and floods. 'Carbon' features frequently in three budget speeches—Assam, Karnataka, and Tamil Nadu—reflecting the focus on carbon credit frameworks and net-zero targets. The Delhi budget speech mentions 'pollution' most frequently (nine times), which is indicative of the massive air and water pollution challenges the state is facing.

---

[21] Finance Department, Delhi, Budget Speech 2025–26, 2025, https://finance.delhi.gov.in/sites/default/files/Finance/marquee-files/budget_speech_english_0.pdf

[22] As explained earlier, non-contextual references have been omitted. Although climate-relevant keywords have been mentioned more frequently than shown in the Table 1, only unique mentions have been considered in the analysis.

Table 1: Keyword appearance in 2025-26 annual budget speeches

State	Number of unique mentions (contextual)									
	Climate	Mitigation	Adaptation	Green	Environment	Pollution	Disaster	Carbon	Renewable	Total
Tamil Nadu	4	1	0	6	9	3	7	3	5	38
Karnataka	5	8	0	3	7	1	7	3	2	36
Gujarat	6	1	0	10	4	0	5	1	6	33
Rajasthan	4	1	2	16	4	1	1	1	1	31
Odisha	6	0	0	7	3	0	9	1	2	28
Assam	5	0	0	9	4	0	4	3	2	27
Delhi	1	0	0	5	7	9	2	0	2	26
Arunachal Pradesh	4	2	2	3	3	0	0	0	0	14
Andhra Pradesh	0	0	0	3	2	2	0	0	2	9

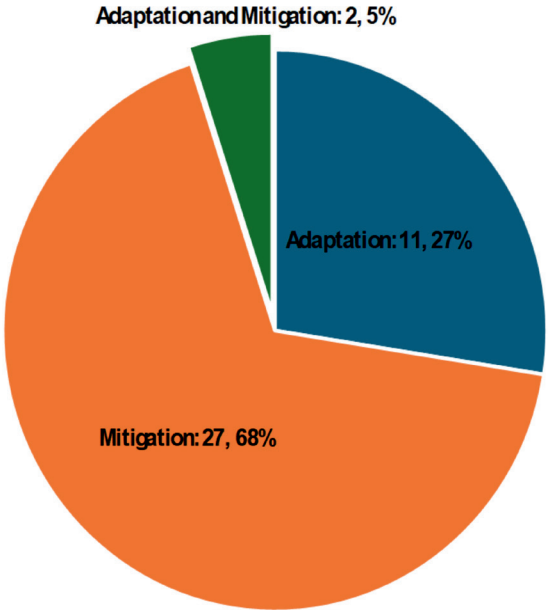
Source: Compiled by authors from the nine state budget speeches.

4.2. Prominence to climate action - dedicated sections versus sectoral integration: Assam, Gujarat, Odisha, and Tamil Nadu stand out for including dedicated Climate Change sections in their budget speeches [23] Other states have presented their climate actions under multiple departments like forest, agriculture, energy, industries, urban development, and disaster management.

4.3. Types of climate action: Of the 40 climate-related measures analysed, 27 are mitigation actions—primarily focused on emission reduction, such as inducting EV buses into public transport; enhancing carbon sinks through afforestation; or facilitating low-carbon transitions seen in Rajasthan's Circular Economy Incentive Scheme. Eleven measures are adaptation actions. These include efforts to improve resilience, such as Gujarat's investment in climate-resilient roads, Tamil Nadu's proposal to build new reservoirs to address water shortages, or location-specific solutions like sponge parks in the Chennai metropolitan area. Two initiatives—Gujarat's Climate Change Fund and Odisha's AI Mission—incorporate both mitigation and adaptation elements. Figure 1 shows the distribution of climate actions by type.

[23] *Assam budget 2025-26 has presented announcements under a section dedicated to the Science, Technology and Climate Change Department.*

Figure 1: Distribution of announcements by type of climate action



Source: Prepared by authors based on analysis of nine state budget speeches.

4.4. Common climate priorities: Energy, mobility, land use, and biodiversity commonly emerge as top climate priorities across state budgets. This is on expected lines, given that these sectors contribute the maximum to climate change. Disaster management is the other focus area, which indicates that states are increasing their attention to adaptation, realising that certain climate change impacts are irreversible.

4.5. All-round focus: As the discourse around climate change intensifies, we see a perceptible shift in the manner state governments are dealing with the issue. While initially, one would find a handful of announcements on climate-related infrastructure investments in state budgets, states are now adopting a more holistic approach by announcing climate-related policies, institutional changes, and capacity enhancement measures alongside programs and schemes and infrastructure investments for climate action.

4.6. Knowledge management: Realising that the landscape of solutions to address climate change is still evolving, we can see state governments willing to commit budgetary resources behind study, research, and knowledge management on climate topics. On the other hand, it also indicates that states see concrete returns accruing from such investments – financial as well as non-financial in terms of better competitiveness of various sectors and improved quality of life for citizens.

4.7. Aligning with global and national climate policy and technology shifts: It is heartening to see states demonstrating foresight in preparing their economies to adapt to global changes in climate policy such as cross-border carbon adjustment tariffs. This is evident from Rajasthan's 'green audits' for highly polluting industries, and Tamil Nadu's climate-linked trade policies, and blue flag certification for beaches in Tamil Nadu and Odisha. Likewise, we can see states preparing for the impending opening of voluntary carbon markets in India with several states announcing carbon credit generation measures in their budgets. States are not hesitating to put money behind experimenting with emerging clean technologies like green hydrogen, sponge cities, mass energy storage systems, and artificial intelligence.

4.8. Green budgets: Among the nine states covered, Odisha [24] and Rajasthan [25] present a separate Green Budget for 2025-26. A green budget helps identify environment and climate investments distinctly and track their execution and ultimate outcomes. It is also a significant step towards transparent budget disclosure and improves the credibility of the state's climate change efforts.

In addition to Odisha and Rajasthan among study states, Assam, Bihar, Meghalaya, and Puducherry have also been presenting green budgets[26]. These budgets, anchored in their respective SAPCCs and aligned with the NAPCC, identify climate-vulnerable sectors and track associated public expenditures. The budgets cover nine common sectors: agriculture and allied activities, forestry and biodiversity, water resources, energy, science, technology and climate change, disaster management, health, transport, and urban and rural development.

States include additional sectors in their green/ climate budgets reflecting local priorities. For instance, Bihar's green budget tracks expenditures in the sugar industry, while Puducherry's green budget includes fisheries. Meghalaya includes the Home Department due to its role in disaster management. Further, Bihar uses the objective of the scheme as a determinant for inclusion—for example, tracking expenditures under the Pradhan Mantri Gram Sadak Yojana, which employs green technologies in road construction.

While the overall approach to green budgeting is broadly similar across states, climate budget tagging methodologies vary [27]. Odisha employs a more advanced framework, conducting an appraisal to determine each sector's exposure to climate risk. Programme-level linkages to climate change are assessed along two dimensions: the extent to which a programme enhances resilience (Climate Change Relevance Share) and the degree to which it is vulnerable to climate impacts in the absence of appropriate planning interventions (Climate Change Sensitivity Share). Based on these assessments, programmes are categorised into high- or low-risk using a matrix. In contrast, Meghalaya adopts a simpler model, tagging department-wise budget allocations separately for mitigation and adaptation. Puducherry maps programmes to specific themes, activities, and relevant Sustainable Development Goals (SDGs).

Likewise, while the format of budget presentation is generally comparable across states, Bihar stands out in benchmarking performance on sustainability and climate indices against national averages [28].

5. Recommendations

a. Improving presentation of climate actions: Both methods of presenting climate announcements in the budget speech, namely, presenting all announcements under an exclusive section on 'climate change' or showing individual announcements separately

[24] Finance Department, Odisha, Climate Budget 2025–26 with CCIA Annexure, 2025, https://finance.odisha.gov.in/sites/default/files/2025-03/Appended%20Climate%20Budget%202025-26%20with%20CCIA%20Annexure_0.pdf.

[25] Finance Department, Rajasthan, Climate Budget Volume IV (2025–26), 2025, Climate Budgets: https://finance.rajasthan.gov.in/docs/budget/statebudget/2025-2026/Vol4e.pdf

[26] Assam published its first green budget in 2023-24. However, the website of the finance department does not present a separate statement for 2025-26.

[27] Just like how a baggage tag of every piece of baggage at the airport mentions details of its owner, flight and so on, Climate Budget Tagging (CBT) entails attaching a 'climate tag' to every line item of the government budget. To know more about CBT, read 'Climate Budgeting powered by Climate Budget Tagging: An Effective PFM Tool in the Fight Against Climate change' at https://resource.cdn.icai.org/73869cajournal-may2023-13.pdf

[28] For more insights on the climate budget practices adopted by the states, see 'A Comparison of Climate Budgets Presented by State Governments in India' at https://resource.cdn.icai.org/79701cajournal-apr2024-13.pdf

under each department, have their unique utility for readers. An effective presentation approach to communicate the state's climate initiatives clearly could be to list climate actions under individual relevant departments and additionally provide a summary or annexure of all climate announcements in one place.

b. Specificity and clarity in announcements: Several announcements in the budget speeches analysed were observed to be presented merely as statements. Since the budget is a key public-facing document and a tool for legislators to inform citizens, speeches should go beyond simple declarations. They must include details such as financial allocations and broad action plans to provide context and demonstrate clear intent to integrate broader policy and economic planning with climate action.

c. Integrating performance information: The state budget serves not only as a platform for new announcements but also as a record of progress against past commitments and policy direction. While all states have developed SAPCCs, budget speeches rarely provide updates on their implementation or alignment with fiscal planning. This underscores the relevance of green budgeting frameworks. Odisha's green budget, for example, maps national and international climate commitments—up to COP29—and links them to specific state-level actions. Additionally, incorporating performance indicators such as GHG reductions, emission intensity, outcomes of past mitigation efforts, and progress against relevant Sustainable Development Goals (SDG) would enhance transparency and demonstrate sustained climate commitment.

d. Adopting green budgeting: States should attempt to present a "green budget" along with the main budget. This will help them leverage the benefits of green budgeting practices such as linking expenditure to climate action, identifying funding gaps, and aligning investments with climate priorities. Odisha's green budget, for instance, was based on an analysis of the actual, revised, and budget estimates of climate-related expenditure across eleven departments. The analysis revealed that sectors like agriculture, disaster management, energy, and forestry have high climate relevance—highlighting strong potential for targeted adaptation and mitigation efforts [29].

References

Ashok Rao, CA. (2023, May). Climate budgeting powered by climate budget tagging: An effective PFM tool in the fight against climate change. The Chartered Accountant Journal. https://resource.cdn.icai.org/73869cajournal-may2023-13.pdf

Ashok Rao, CA., & Chandra, A. (2024, April). A comparison of climate budgets presented by state governments in India. The Chartered Accountant Journal. https://resource.cdn.icai.org/79701cajournal-apr2024-13.pdf

Finance Department, Assam. (2025). Budget speech 2025–26. https://finance.assam.gov.in/portlets/assam-budget-2025-26

Finance Department, Andhra Pradesh. (2025). Budget speech 2025–26. https://apfinance.gov.in/...Bud@et25-26/documents/SpeechEnglish.pdf

Finance Department, Arunachal Pradesh. (2025). Budget speech 2025–26. https://www.arunachalbudget.in/docs/speech1.pdf

[29] *International Monetary Fund (IMF). (2022, December). New IMF guidance on green PFM. https://blog-pfm.imf.org/en/pfmblog/2022/12/new-imf-guidance-on-green-pfm*

United Nations Development Programme (UNDP), Knowing What You Spend: Guidance Note for Governments to Track Climate Change Finance in Their Budgets, https://www.undp.org/publications/knowing-what-you-spend-guidance-note-governments-track-climate-change-finance-their-budgets

Finance Department, Delhi. (2025). Budget speech 2025–26. https://finance.delhi.gov.in/sites/default/files/Finance/marquee-files/budget_speech_english_0.pdf

Finance Department, Gujarat. (2025). Budget speech 2025–26. https://financedepartment.gujarat.gov.in/Budget-speech.html

Finance Department, Karnataka. (2025). Budget speech 2025–26. https://finance.karnataka.gov.in/uploads/media_to_upload1741332694.pdf

Finance Department, Odisha. (2025a). General budget speech 2025–26 (Part II). https://finance.odisha.gov.in/sites/default/files/2025-02/Part-II%20General%20Budget%20Speech%202025-26_Eng.pdf

Finance Department, Odisha. (2025b). Climate budget 2025–26 with CCIA annexure. https://finance.odisha.gov.in/sites/default/files/2025-03/Appended%20Climate%20Budget%202025-26%20with%20CCIA%20Annexure_0.pdf

Finance Department, Rajasthan. (2025a). Budget speech 2025–26. https://finance.rajasthan.gov.in/docs/budget/statebudget/2025-2026/BudgetSpeech202526.pdf

Finance Department, Rajasthan. (2025b). Climate budget volume IV (2025–26). https://finance.rajasthan.gov.in/docs/budget/statebudget/2025-2026/Vol4e.pdf

Finance Department, Tamil Nadu. (2025). Budget speech 2025–26. https://cms.tn.gov.in/cms_migrated/document/docfiles/budget_speech_e_2025_2026.pdf

International Monetary Fund (IMF). (2022, December). New IMF guidance on green PFM. https://blog-pfm.imf.org/en/pfmblog/2022/12/new-imf-guidance-on-green-pfm

Press Information Bureau. (2021, November 3). India's commitment under Panchamrit at COP26 – Summary. https://www.pib.gov.in/PressReleasePage.aspx?PRID=1795071

United Nations Development Programme (UNDP). (n.d.). Knowing what you spend: Guidance note for governments to track climate change finance in their budgets. https://www.undp.org/publications/knowing-what-you-spend-guidance-note-governments-track-climate-change-finance-their-budgets

United Nations Framework Convention on Climate Change (UNFCCC). (n.d.). NDC registry – India. https://unfccc.int/NDCREG

Does social capital improve management of fiscal policy? Evidence from India

Shiv Kumar [1]

Abstract

The present paper shows the relation between social capital and fiscal policy management based on field survey data collected from 1325 individuals by World Values Survey, Wave 7 in India in 2023. Social capital is measured as the additive score of the membership of people in local groups and active participation in these groups. At national level, mean score for individuals on the social capital index is 25.66 points out of possible 100 points. Among the states, Bihar has the highest mean score on social capital followed by Maharashtra. Using the composite Fiscal Health Index (FHI) score, as computed by NITI Aayog (2025) for 18 major states in India, it is found that a state with high social capital has better fiscal health, and allocated more funds on social and infrastructural activities than a state with low level of social capital.

JEL Classification Codes: *D71, H3, Z13.*

1. Introduction

Social capital is an evolving concept. It relates to the social norms, networks and trust that facilitates cooperation within or between groups. Social capital can generate benefits to society by reducing the transaction costs, promoting cooperative behaviour, diffusing knowledge and innovations, and through enhancements to personal well-being and associated spill-overs (Productivity Commission, 2003). Fiscal performance in India can also be based on social trust on fiscal institutions that emphasizes social need for economic development. Social capital indirectly controls the fiscal performance of the elected government (Dinda, 2018). The structural dimension of social capital plays a role in expanding information channels. In contrast, the relational dimension of social capital works through shared norms and trust, eventually improving people's fairness perception (Wang et al., 2023).

In this paper the relation between social capital and effective implementation of fiscal policy is analyzed using the field survey data collected by World Values Survey [2], Wave 7 in India (Haerpfer et al., 2022) and by NITI Aayog's Fiscal Health Index (NITI Aayog, 2025). Social capital is measured as the additive score of the membership of people in local groups and active participation in these groups. To check the fiscal health of states, the composite Fiscal Health Index (FHI) score, as computed by NITI Aayog (2025) for 18 major states in India, is used.

Rest of the paper is organized as follows. Following introduction, second section presents alternative perspective of social capital. Methodology and data are given in section three. Section four measures the social capital in India. Section five presents the fiscal health index and evaluates the relationship between fiscal policy and social capital in India. Section six include conclusion and implications.

[1] *Associate Professor of Economics, A.S. College, Khanna, Punjab, India – 141 417. E-mail: shiv7.kumar7@gmail.com*

[2] *Since Wave 2 (1990-94), Indian data collection is a regular feature of World Values Survey; Wave 3 (1995-98), Wave 4 (1999-2004), Wave 5 (2005-09), Wave 6 (2010-14), Wave 7 (2017-22). The work on Wave 8 (2024-26) is in progress. The WVS-8 questionnaire has been elaborated with inclusion of such new topics as political trust, authoritraianism and populism, migration, climate change and family planning.*

2. Alternative perspectives of social capital

One of the pioneers in the study of social capital is Hanifan[3] (1920) who argued that "social capital…refer(s) to…those tangible assets (that) count for most in the daily lives of people, namely: goodwill, fellowship, sympathy, and social intercourse among the individuals and families who make up a social unit." Other include, Jacobs (1961), Bourdieu and Passeron (1977), Loury (1977) [As cited in Woolcock, 1998], and Meehan et al. (1978). Bourdieu (1984; 1986) developed the concept of social capital during the 1970s and 1980s, but it attracted much less attention than other areas of his social theory. In the past 30-35 years, Putnam (1993; 1995) and Coleman (1988; 1990) are credited with bringing the term "social capital" to prominence [4].

Social capital is often defined as a sociological variable, i.e., referring to the relationships between people. From this perspective, social capital is relational, not something owned by any individual, but rather something shared in common. Further, there is a perspective that social capital stands for the ability of actors to secure benefits by virtue of membership in networks or other social structures (Portes, 1998). Thus, it is possible to distinguish 'individual' and 'group' social capital. Individual social capital, sometimes referred to as 'social network capital', can be defined as the set of social attributes possessed by an individual – including charisma, contacts and linguistic skill – that increase the returns to that individual in his or her dealings with others. Community-level 'group' social capital is defined as the set of social resources of a community that increases the welfare of that community (Glaeser et al., 2002). Bezemer et al. (2004) used the term 'relational capital' for individual social capital, and 'social network' or 'communal social capital' for group social capital.

Knack (1999; 2002) differentiated social capital as government social capital and civil social capital. He defined government social capital as the institutions, the rule of law, and the civil liberties that influence people's ability to cooperate for mutual benefit; and civil social capital as the common values, norms, informal networks, and associational memberships that affect the ability of individuals to work together to achieve common goals. Grafton and Knowles (2004) distinguished between civic social capital and public institutional social capital, with the latter being defined by measures of corruption and democracy. Grootaert (1999) talked about a macro level of social capital which includes institutions such as government, the rule of law, civil and political liberties etc. These notions of government, public institutional and macro social capital are identical to formal institutions. Collier (1998) noted that many people restrict the term "social capital" to civil social capital.

However, for the individual level study to find the inter-linkage between social capital and fiscal performance, we limit the scope of social capital to civil social capital.

3. Methodology

3.1. Database

This study is based on data collected from 1325 individuals by World Values Survey (WVS) wave 7 in India in 2023. The WVS is a global research project that explores people's values and beliefs, how they change over time and what social and political impact they have. It is carried out by a worldwide network of social scientists who, since 1981, have conducted representative national surveys in almost 80 countries. The work is also frequently used by governments around the world, scholars, students, journalists

[3] Hanifan, an educational adminstrator, was interested in the contribution of 'goodwill, fellowship mutual sympathy and social intercourse' to collective prosperity and well-being, an argument he then used to bolster his case for community centres in rural areas (Farr, 2004).

[4] Foley and Edwards (1999) have described Pierre Bourdieu, James S. Coleman and Robert D. Putnam as representing three 'relatively distinct tributaries' in the literature on social capital.

and international organizations and institutions such as the World Bank and the United Nations (UNDP and UN-Habitat). Our study is based on the individual responses for 21 questions out of a total set of 290 common questions used in WVS in all countries. The collected data are analyzed by using correlation, t-test, F test, one way ANOVA, multiple comparison of means test by applying post Hoc test and descriptive statistics. A Post Hoc test determines which specific group means differ significantly from each other. To check fiscal health of different states in India, data from Fiscal Health Report of NITI Aayog (2025) for the financial year 2023 is used.

3.2. Measurement of social capital

The effectiveness of social capital to reduce opportunistic behavior, to disseminate information, and to facilitate collective decision making depends on many aspects of the groups and organizations like group membership, working with others in the community and active participation in the organizations. In India, there are many formal and informal organizations, groups and networks like, art, music or educational organizations, church and other religious organizations, consumer organizations, environmental organizations, humanitarian or charitable organizations, labor unions, political parties, professional associations, self-help or mutual aid groups, sports or recreational organizations etc. In our study, membership of individuals in voluntary organizations is considered as a proxy measure of social capital.

Each individual is asked in the survey whether he/she is an active member, an inactive member or not a member of that type of organization. Overall, out of 1325 sampled individuals, 992 are members of one or more organizations with a maximum number of group memberships for an individual as twelve. The total number of memberships added up to 5739, which indicates that on average each individual (out of 992) is a member of about six organizations (Table 1). The percentage of total memberships is found to be 36.09.

Table 1: Membership of individuals in voluntary organizations in India

Organization	Total Membership	Active Member	Inactive Member
Church or Religious Organization	645 (48.68)	337 (52.25)	308 (47.75)
Art, Music or Educational Organization	561 (42.31)	279 (49.73)	282 (50.27)
Sports or Recreational Organization	560 (42.23)	234 (41.79)	326 (58.21)
Self-Help Group, Mutual Aid Group	516 (38.94)	272 (52.71)	244 (47.29)
Women's Group	500 (37.74)	221 (44.20)	279 (55.80)
Professional Association	469 (35.40)	191 (40.72)	278 (59.28)
Political Party	455 (34.34)	165 (36.26)	290 (63.74)
Labor Union	430 (32.45)	128 (29.77)	302 (70.23)
Environmental Organization	422 (31.85)	149 (35.31)	273 (64.69)
Humanitarian or Charitable Organization	405 (30.57)	146 (36.05)	259 (63.95)
Consumer Organization	377 (28.45)	144 (38.20)	233 (61.80)
Other Organizations	399 (30.11)	153 (38.35)	246 (61.65)
Total	**5739 (36.09)**	**2419 (42.15)**	**3320 (57.85)**

Source: Author's calculation using the unit level data in World Values Survey, Wave 7, India 2023.

Notes: Figures in parenthesis are per cent values.

Active participation in the group activities is more beneficial for collective action than merely joining a group. This is measured by total number of active members in the organization as a percentage of total number of members in the organization. Accordingly, Table 1 shows that, out of 5739 memberships, individuals are active in 2419 memberships which indicate that individuals actively participate in more than two associations. Membership is most common in Church or religious organizations (48.68%), art, music or educational organization (42.31%), and sports or recreational organizations (42.23%). In addition to these three types of organizations, individuals participate actively in the group activities in self-help group, mutual aid group, women's group, and professional associations.

Individual scores on membership in the above 12 types of organizations are added and the resultant score is rescaled from 0 to 100 to construct the additive Social Capital Index (SCI) where 0 represents the lowest level of social capital. At all India level, mean score for individuals on the SCI is found to be 25.66 and standard deviation 26.44 (Table 2). To compare more than two means, One Way ANOVA test is applied. Level of significance of the difference in mean scores of social capital by different characteristics of the individuals is given in Annexure 1.

Table 2 shows that the absolute mean differences of social capital scores among individuals with different age groups, and different marital status are statistically insignificant. With an increase in level of education, the social capital mean score has increased from 17.23 to 26.82. The social capital mean score for graduate individuals is 28.92 which is the highest score and its difference (11.69) is statistically significant (at 0.05 level of significance) from social capital mean score of individuals with no education who have the lowest score (17.23). Male individuals have a higher mean score on social capital than the female respondents. On the basis of income of individuals, the mean score on social capital follows a J-shaped pattern with a little fall up to the middle quintile and then a sharp rise thereafter. Individuals in the richest quintile of income group have the highest and statistically significant mean score of social capital than all other individuals falling in the first four quintiles of income. In addition, the social capital is related to the religious composition of individuals. For instance, individuals in Sikhism religion have the lowest mean score of 10.24 points which is significantly lower than individuals in Hindu, Muslim and Other religious groups. Among the states, Bihar has the highest mean score on social capital and Maharashtra has the second highest. Interestingly, rural India has a higher social capital than the urban part of the country.

Table 2: Mean score of social capital by individual characteristics

Individual Characteristics	Number of Individuals	Social Capital: Mean Score (Standard Deviation)
Age (in Years)		
16-30	610	25.52 (26.22)
31-40	242	26.07 (26.58)
41-50	219	26.81 (26.77)
51-60	154	27.08 (26.67)
61 & above	100	20.79 (26.24)
Education Level		
No Education	104	17.23 (21.86)
Primary	124	25.97 (26.59)

Individual Characteristics	Number of Individuals	Social Capital: Mean Score (Standard Deviation)
Secondarya	711	25.91 (27.22)
Senior Secondary	57	23.10 (25.83)
Graduation	201	28.92 (24.39)
Post Graduation & aboveb	128	26.82 (27.59)
Gender		
Male	772	28.47 (27.34)
Female	553	21.74 (24.61)
Income Group		
Poorest	194	21.86 (26.48)
2nd Quintile	268	21.05 (23.83)
3rd Quintile	360	19.33 (21.70)
4th Quintile	341	27.92 (26.89)
Richest	162	47.12 (27.78)
Marital Status		
Marriedc	780	26.53 (26.76)
Separatedd	54	18.90 (25.11)
Single	491	25.02 (25.99)
Religion		
Hindu	1079	26.79 (26.73)
Muslim	140	24.32 (25.61)
Sikhism	72	10.24 (15.13)
Othere	34	27.94 (29.63)
State		
Bihar	204	51.76 (20.73)
Delhi	207	17.29 (20.17)
Haryana	64	17.38 (24.04)
Maharashtra	150	30.72 (30.80)
Punjab	103	9.71 (15.35)
Telangana	160	12.81 (13.62)
Uttar Pradesh	254	24.54 (30.03)
West Bengal	183	26.53 (20.99)
Urban Rural		
Urban	492	21.87 (23.74)
Rural	833	27.90 (27.68)
All	***1325***	***25.66 (26.44)***

Source: Same as in Table 1.

Notes: a. Secondary includes Lower Secondary (Middle) (152 respondents), and Upper Secondary (Matric) (559 respondents).

b. Post Graduation and above includes Master or equivalent (106 respondents), and Doctoral or equivalent (22 respondents).

c. Married includes Married (667 respondents), and Living together as Married (113 respondents).

d. Separated includes Separated (1 respondent), and Widowed (53 respondents).

e. Other includes Roman Catholic (13 respondents), Buddhist (19 respondents), and Other nfd. (2 respondents).

4. Fiscal policy and social capital

The fiscal health of states is a cornerstone for India's sustainable economic development and effective governance. As India moves towards a more competitive and inclusive economic framework, the fiscal performance of individual states becomes pivotal to their development performance. States are the key players in allocation of resources for such critical areas as agriculture, poverty alleviation, human development, urbanization and infrastructure provision. Effective fiscal management at the state level can catalyze growth, improve social welfare, and foster regional economic convergence (NITI Aayog, 2025). To assess the state level financial performance, a Fiscal Health Index (FHI) is constructed by the NITI Aayog (2025). FHI evaluates states on five major sub-indices: Quality of Expenditure, Revenue Mobilization, Fiscal Prudence, Debt Index and Debt Sustainability. These five major sub-indices are further divided into minor sub-indices as summarized in Table 3.

Table 3: Major and minor sub-indices of fiscal health index

Major Sub-Indices	Minor Sub-Indices
1. Quality of Expenditure	(i) Total Developmental Expenditure/Total Expenditure
	(ii) Total Capital Outlay/GSDP (Gross State Domestic Product)
2. Revenue Mobilization	(iii) State Own Revenue/GSDP
	(iv) State Own Revenue/Total Expenditure
3. Fiscal Prudence	(v) Gross Fiscal Deficit/GSDP
	(vi) Revenue Deficit/GSDP
4. Debt Index	(vii) Interest Payments/Revenue Receipts
	(viii) Outstanding Liabilities/GSDP
5. Debt Sustainability	(ix) Growth Rate of GSDP – Growth Rate of Interest Payments

Source: NITI Aayog (2025).

The detailed description of the five major sub-indices and their respective minor sub-indices is elaborated below as given in NITI Aayog (2025):

A. Quality of Expenditure:

Developmental expenditure refers to government spending aimed at fostering long-term economic growth and improving infrastructure or social services, such as building schools or hospitals. Total expenditure is equal to developmental and non-developmental expenditure. Non-developmental expenditure includes spending necessary for maintaining current government functions and services, like paying salaries and covering operational costs.

(i) Total Developmental Expenditure/ Total Expenditure: This ratio measures the proportion of a government's total spending that is allocated to developmental activities. This metric is useful for assessing the effectiveness and priorities of a government's budgetary policies.

(ii) Total Capital Outlay/GSDP: This ratio measures how much of the state's economic resources are being directed towards capital projects, such as infrastructure facilities, and other long-term investments. This assesses how effectively a state is leveraging its economic output for long-term benefits.

B. Revenue Mobilization

(iii) State Own Revenue/GSDP: This ratio reflects the state's ability to generate

revenue independently without relying heavily on central government transfers or grants. It provides insights into a state's financial sustainability and its capacity to fund its own developmental and operational needs.

(iv) State Own Revenue/Total Expenditure: This ratio indicates how much of the state's expenditures is covered by its own revenues, reflecting fiscal independence.

C. Fiscal Prudence

(v) Gross Fiscal Deficit/GSDP: A higher ratio may signal potential concerns regarding the sustainability of the state's debt levels, as it suggests that the state is borrowing relative to its economic size.

(vi) Revenue Deficit/GSDP: A high ratio indicates that the state is not generating enough revenue to meet its operating expenditure and relies on borrowing (financed by deficit financing) to finance its activities and has potential risk to state budget.

D. Debt Index

(vii) Interest Payments/Revenue Receipts: The ratio of interest payments to revenue receipts (IP/RR) measures the percentage of revenue receipts used for interest payment on account of outstanding debt. A high IP/RR indicates that the state is spending a significant amount of its revenue on debt servicing, which can be a sign of impending financial stress.

(viii) Outstanding Liabilities/GSDP: This ratio indicates how much of the GSDP is taken up by debt stock. It reflects the debt burden of the state. A high ratio indicates that the state is heavily indebted.

E. Debt Sustainability

(ix) Growth Rate of GSDP – Growth Rate of Interest Payments: A positive difference suggests a healthy economic environment where the state can manage its debt, while a negative difference indicates a growing fiscal stress and potential challenges in managing public finances.

To construct FHI, the values obtained from above nine minor sub-indices are standardized through normalization. The minor sub-indices are classified into one of two categories, Improvement Index or the Deprivation Index, as defined below:

- Improvement Index: The Improvement Index is constructed in such a way that the higher the ratio for a state, greater the index value assigned to it. The minor sub-indices under Quality of Expenditure, Revenue Mobilization, and Debt Sustainability are considered as improvement indices.

  Improvement Index for State

  $$i = \frac{x_i - Min\,(x)}{Target\,(x) - Min\,(x)} \times 100$$

  Where, xi is value for a particular minor sub-index under Quality of Expenditure, Revenue Mobilization, and Debt Sustainability, Min (x) is the minimum value for the particular minor sub-index across all states in the specified period, and Target (x) is the highest value (of the maximum of all the states in each year) observed over the past 9 years.

- Deprivation Index: The index is constructed in such a way that lower the ratio for a state, greater the index value assigned to it. The minor sub-indices under Fiscal Prudence

and Debt Index are considered as Deprivation Indices.

Deprivation Index for State

$$i = \frac{Max\ (x) - x_i}{Max\ (x) - Target\ (x)} \times 100$$

Where, Max (x) is the maximum value for the particular minor sub-index across all states in the specified period, xi is the value for the particular minor sub-index under Fiscal Prudence and Debt Index, and Target (x) is the lowest value (of the minimum of all the states in each year) observed over the past 9 years.

The major sub-indices are then computed by taking arithmetic mean of the normalized values of the corresponding minor sub-indices for each state. The final composite FHI score is computed by taking the arithmetic mean of the five major sub-indices, computed by the above steps. For instance, the FHI score for Bihar is the arithmetic mean of values for its five major sub-indices. The FHI score of 18 major states in India is presented in Annexure 2.

Social capital may broaden the policy options available to the governments. "New and potentially powerful regional governments were established throughout Italy in the 1970s. Governments in the non civic-minded South have been found to be inefficient, lethargic and corrupt. By contrast, a number of those in the North, where levels of civic and social engagement beyond the immediate family are higher, have been adjudged successful in managing the public's business efficiently and satisfying their constituents (Putnam 1993)." Table 2 shows that Bihar has the highest social capital mean score (51.76) whereas Punjab state has the lowest score (9.71).

To analyze the efficacy of fiscal policy, Bihar and Punjab are compared with their recent fiscal health as well as some of the social sector indicators. It is observed in Table 4 that Bihar with high social capital has the higher FHI score 27.8 as compared to the state of Punjab which has the lower FHI score 10.7. Similarly, Bihar has the higher Quality of Expenditure Index score 56.1 whereas Punjab has the lowest score of 4.7.

Table 4: Social capital, fiscal health and social indicators

Indicator	Bihar	Punjab
Social Capital Index	51.76	9.71
Fiscal health		
FHI Score in 2022-23	27.8	10.7
Quality of Expenditure Index Score in 2022-23	56.1	4.7
Fiscal deficit as % of GSDP (2024-25 BE)	3.0	3.8
Revenue balance as % of GSDP (2024-25 BE)	0.1	-2.9
SGST revenue in 2023-24 (as % of GSDP)	3.4	2.8
Committed expenditure as % of revenue receipts (2024-25 BE)	41	76
Expenditure on subsidies as % of revenue receipts in 2022-23	9	24
Outstanding liabilities as % of GSDP (as of March 2024)	37	48
Budgetary allocation on social sector and infrastructure		
Allocation to education as % of budget	21.4	12.9
Allocation to health and family welfare as % of budget	5.7	4.6
Allocation to water supply and sanitation as % of budget	1.5	1.2

Indicator	Bihar	Punjab
Allocation to welfare of SC, ST, OBC, and minorities as % of budget	1.4	1.1
Allocation to housing as % of budget	2.1	1.1
Allocation to irrigation and flood control as % of budget	2.1	1.6
Allocation to roads and bridges as % of budget	3.0	1.4
Allocation to rural development as % of budget	10.6	0.8
Allocation to urban development as % of budget	4.1	1.0

Source: Chakrabarty and Singh (2024); NITI Aayog (2025); RBI (2024).

Notes: Committed expenditure includes expenditure on salaries, pensions, and interest payments.
BE: Budget Estimates; GSDP: Gross State Domestic Product; OBC: Other Backward Class; SC: Scheduled Castes; SGST: State Goods and Services Tax; ST: Scheduled Tribes.

Table 4 shows that the state of Bihar with high social capital score of 51.76 points maintained the fiscal deficit limit of 3% as recommended by the 15th Finance Commission of Government of India. The N.K. Singh committee appointed by Government of India to review the Fiscal Responsibility and Budget Management (FRBM) Act also recommended that the Central government should target a fiscal deficit of 3% of GDP in years upto March 31, 2020 and to 2.5% of GDP by 2022-23 (Government of India, 2017). On the other hand, the state of Punjab with low social capital score of 9.71 points has crossed this limit to 3.8%. Further, Table 4 shows that the state of Punjab with low social capital has higher revenue deficit (-2.9%) whereas Bihar with high social capital has revenue surplus (0.1%). Other important correlates of social capital and fiscal health performance indicators are as follows.

a) Goods and Services Tax (GST), introduced in 2017, has become the source of revenue for most states in India. There is a remarkable variation in State GST (SGST) revenue between Bihar and Punjab. In Bihar, SGST to gross state domestic product (GSDP) ratio (3.4%) is higher than Punjab (2.8%).

b) Committed expenditure of a state typically includes expenditure on payment of salaries, pensions, and interest payments. Expenditure on these items usually cannot be reduced in the short to medium term. A larger proportion of the state budget allocated for committed expenditure crowds out expenditure on other development activities. Bihar with a high social capital has a lower committed expenditure (41%) than Punjab (76%).

c) States provide subsidies on various items such as supply of electricity, public distribution system, education, and health. The expenditure on subsidies reduces the funds available for the development and capital expenditure. With low social capital Punjab has higher expenditure on subsidies (24%) than Bihar (9%).

d) Outstanding liabilities refer to the debt accumulated by the states from past borrowings and other liabilities including public account. Higher outstanding liabilities indicate a higher obligation for a state to repay loans in the coming years with higher interest payments. Bihar has a lower outstanding liabilities (37%) than Punjab (48%).

e) The share of expenditure on a sector denotes the share of that sector in the state's budget. Expenditure on a sector is the sum of the revenue expenditure and the capital outlay in that sector. As compared with Punjab, Bihar with high social capital has larger share of

expenditure on education, health and family welfare, water supply and sanitation, welfare of SC, ST, OBC and minorities, housing, irrigation and flood control, roads and bridges, rural and urban development.

5. Conclusion and implications

The relation between social capital and fiscal policy management is analysed using the data collected by World Values Survey, Wave 7 in India in 2023. Social capital is measured as an additive score of membership of people in local groups and active participation in these groups. Our analysis shows that Bihar, a state with high social capital, has a high Fiscal Health Index in terms of higher quality of expenditure, low fiscal deficit, higher revenue surplus, earns more revenue from state goods and services tax, lower expenditure on salaries, pensions, interest payments and subsidies, and lower outstanding liabilities as compared with the state with low social capital. Bihar has also allocated more budgetary funds for education, health and family welfare, water supply and sanitation, welfare of SC (Scheduled Castes), ST (Scheduled Tribes), OBC (Other Backward Class) and minorities, housing, irrigation and flood control, roads and bridges, rural and urban development. These results indicate that a higher social capital does improve the fiscal policy performance and management in India.

References

Bezemer, D.J., Dulleck, U. and Frijters, P. (2004) Social Capital, Creative Destruction and Economic Growth. Working/Discussion Paper No. 186a, School of Economics and Finance. Brisbane: Queensland University of Technology.

Bourdieu, P. (1984) Distinction: A Social Critique of the Judgement of Taste, Translated by Richard Nice. Cambridge, Massachusetts: Harvard University Press.

- (1986) "The Forms of Capital", in Handbook of Theory and Research for the Sociology of Education, J.G. Richardson (ed.). Westport, Connecticut: Greenwood Press.

Bourdieu, P. and Passeron, J.C. (1977) Reproduction in Education, Society and Culture, Translated by Richard Nice. London: Sage Publications.

Chakrabarty, T. and Singh, S. (2024) State of State Finances. PRS Legislative Research. New Delhi: Institute for Policy Research Studies.

Coleman, J.S. (1988) Social Capital in the Creation of Human Capital. American Journal of Sociology, 94(Supplement): S95-S120.

- (1990) Foundations of Social Theory. Cambridge, Massachusetts: Harvard University Press.

Collier, P. (1998) Social Capital and Poverty. Social Capital Initiative Working Paper No. 4, Social Development Department, The World Bank. Washington D.C.: World Bank.

Dinda, S. (2018) Social Capital and Fiscal Performance in India during 1991-2012. International Journal of Social Economics, 45(1): 187-204. https://doi.org/10.1108/IJSE-12-2016-0378

Farr, J. (2004) Social Capital: A Conceptual History. Political Theory, 32(1): 6-33.

Foley, M.W. and Edwards, B. (1999) Is It Time to Disinvest in Social Capital? Journal of Public Policy, 19(2): 141-173.

Glaeser, E.L., Laibson, D.I. and Sacerdote, B. (2002) An Economic Approach to Social Capital. The Economic Journal, 112(483): F437-F458.

Government of India. (2017) FRBM Review Committee Report, Volume 1, Responsible

Growth: A Debt and Fiscal Framework for 21st Century India. New Delhi: Department of Economic Affairs, Ministry of Finance.

Grafton, R.Q. and Knowles, S. (2004) Social Capital and National Environmental Performance: A Cross-Sectional Analysis. Journal of Environment and Development, 13(4): 336-370.

Grootaert, C. (1999) Social Capital, Household Welfare and Poverty in Indonesia. Local Level Institutions Working Paper No. 6, Social Development Department, The World Bank. Washington D.C.: World Bank.

Haerpfer, C., Inglehart, R., Moreno, A., Welzel, C., Kizilova, K. Diez-Medrano, J., Lagos, M., Norris, P., Ponarin, E. and Puranen, B. (eds.). (2022) World Values Survey: Round Seven – Country-Pooled Datafile Version 6.0. Madrid, Spain and Vienna, Austria: JD Systems Institute and WVSA Secretariat. Doi:10.14281/18241.24

Hanifan, L.J. (1920) The Community Centre. Boston: Silver, Burdett and Company.

Jacobs, J. (1961) The Death and Life of Great American Cities. New York: Random House.

Knack, S. (1999) Social Capital, Growth and Poverty: A Survey and Extensions. Social Capital Initiative Working Paper No. 7, Social Development Department, The World Bank. Washington, D.C.: World Bank.

- (2002) "Social Capital, Growth and Poverty: A Survey of Cross-Country Evidence", in The Role of Social Capital in Development: An Empirical Assessment, C. Grootaert and T. van Bastelaer (eds.). Cambridge: Cambridge University Press.

Loury, G.C. (1977) "A Dynamic Theory of Racial Income Differences", in Women, Minorities and Employment Discrimination, P.A. Wallace and A. LaMund (eds.). Lexington, Massachusetts: Lexington Books.

Meehan, E.J., Reilly, A.C. and Ramey, T. (1978) In Partnership with People: An Alternative Development Strategy. Rosslyn: Inter-American Foundation.

NITI Aayog. (2025) Fiscal Health Index: Annual Report for the Financial Year 2023. New Delhi: NITI Aayog, Government of India.

Portes, A. (1998) Social Capital: Its Origins and Applications in Modern Sociology. Annual Review of Sociology, 24: 1-24.

Productivity Commission. (2003) Social Capital: Reviewing the Concept and its Policy Implications. Research Paper, AusInfo, Canberra. https://www.pc.gov.au/research/completed/social-capital

Putnam, R.D. (1993) The Prosperous Community: Social Capital and Public Life. The American Prospect, 4(13): 35-42.

- (1995) Bowling Alone: America's Declining Social Capital. Journal of Democracy, 6(1): 65-78.

RBI (2024) State Finances: A study of Budgets, Reserve Bank of India (Mumbai).

Wang, Y., Zhu, H., Aziz, N. and Liu, Y. (2023) Does Social Capital Improve the Effectiveness of Public Service? An Insight from Rural-to-Urban Migrants in China. Social Indicators Research, 165(2): 431-452. https://doi.org/10.1007/s11205-022-03021-5

Woolcock, M. (1998) Social Capital and Economic Development: Towards a Theoretical Synthesis and Policy Framework. Theory and Society, 27(2): 151-208.

Annexure 1: Significance of the difference in mean scores on social capital

Individual Characteristics	Number of Individuals	Mean	S.D.	Significance of the Difference in Mean Scores							
Age (in years)				16-30	31-40	41-50	51-60	61 & above			
16-30	610	25.52	26.22	-	0.55 (2.01)	1.29 (2.08)	1.56 (2.38)	4.73 (2.85)			
31-40	242	26.07	26.58		-	0.74 (2.47)	1.02 (2.72)	5.28 (3.14)			
41-50	219	26.81	26.77			-	0.28 (2.78)	6.02 (3.19)			
51-60	154	27.08	26.67				-	6.29 (3.39)			
61 & above	100	20.79	26.24					-			
				F (4, 1320) = 1.081							
Education Level				No Education	Primary	Secondary	Senior Secondary	Graduation	Post Graduation & above		
No Education	104	17.23	21.86	-	8.75 (3.50)	8.68*** (2.77)	5.87 (4.34)	11.69** (3.18)	9.59 (3.48)		
Primary	124	25.97	26.59		-	0.07 (2.56)	2.87 (4.22)	2.94 (3.01)	0.85 (3.32)		
Secondary[a]	711	25.91	27.22			-	2.81 (3.63)	3.01 (2.10)	0.91 (2.53)		
Senior Secondary	57	23.10	25.83				-	5.82 (3.95)	3.72 (4.19)		
Graduation	201	28.92	24.39					-	2.10 (2.98)		
Post Graduation & above[b]	128	26.82	27.59						-		
				F (5, 1319) = 2.920**							
Gender											
Male	772	28.47	27.34								
Female	553	21.74	24.61	Absolute difference in Mean Scores of Gender = 6.73* (1.44), t = 4.683, d.f. = 1323							
Income Group				Poorest	2nd Quintile	3rd Quintile	4th Quintile	Richest			
Poorest	194	21.86	26.48	-	0.81 (2.36)	2.54 (2.23)	6.06 (2.25)	25.26* (2.66)			
2nd Quintile	268	21.05	23.83		-	1.72 (2.02)	6.87** (2.04)	26.07* (2.49)			
3rd Quintile	360	19.33	21.70			-	8.59* (1.89)	27.79* (2.37)			
4th Quintile	341	27.92	26.89				-	19.20* (2.39)			
Richest	162	47.12	27.78								
				F (4, 1320) = 39.652*							
Marital Status				Married	Separated	Single					
Married[c]	780	26.53	26.76	-	7.62 (3.72)	1.51 (1.52)					
Separated[d]	54	18.90	25.11		-	6.11 (3.79)					

Individual Characteristics	Number of Individuals	Mean	S.D.	Significance of the Difference in Mean Scores							
Single	491	25.02	25.99			-					
				F (2, 1322) = 2.333***							
Religion				Hindu	Muslim	Sikhism	Other				
Hindu	1079	26.79	26.73	-	2.47 (2.35)	16.54* (3.19)	1.15 (4.56)				
Muslim	140	24.32	25.61		-	14.07* (3.80)	3.63 (5.01)				
Sikhism	72	10.24	15.13			-	17.70** (5.45)				
Other[e]	34	27.94	29.63				-				
				F (3, 1321) = 9.189*							
State				Bihar	Delhi	Haryana	Maharashtra	Punjab	Telangana	Uttar Pradesh	West Bengal
Bihar	204	51.76	20.73	-	34.47* (2.29)	34.37* (3.33)	21.03* (2.50)	42.05* (2.81)	38.94* (2.45)	27.22* (2.18)	25.23* (2.37)
Delhi	207	17.29	20.17		-	0.09 (3.32)	13.43* (2.94)	7.58 (2.80)	4.48 (2.45)	7.25 (2.18)	9.24** (2.36)
Haryana	72	10.24	15.13			-	13.34** (3.47)	7.67 (3.70)	4.57 (3.44)	7.16 (3.25)	9.14 (3.37)
Maharashtra	34	27.94	29.63				-	21.01* (2.97)	17.91** (2.64)	6.18 (2.39)	4.20 (2.56)
Punjab	103	9.71	15.35					-	3.10 (2.93)	14.83* (2.71)	16.82* (2.86)
Telangana	160	12.81	13.62						-	11.73* (2.34)	13.71* (2.51)
Uttar Pradesh	254	24.54	30.03							-	1.99 (2.25)
West Bengal	183	26.53	20.99								-
				F (7, 1317) = 56.849*							
Urban Rural											
Urban	492	21.87	23.74								
Rural	833	27.90	27.68	Absolute difference in Mean Scores of Urban Rural = 6.03* (1.44), t = 4.196, d.f. = 1323							
All	1325	25.66	26.44								

Source: Calculated from World Values Survey, Wave 7, India 2023 Data.

Note: Figures in parentheses are standard errors. The mean difference is significant at *0.01 level, **0.05 level, and ***0.10 level.

a. Secondary includes Lower Secondary (Middle) (152 respondents), and Upper Secondary (Matric) (559 respondents).

b. Post Graduation and above includes Master or equivalent (106 respondents), and Doctoral or equivalent (22 respondents).

c. Married includes Married (667 respondents), and Living together as Married (113 respondents).

d. Separated includes Separated (1 respondent), and Widowed (53 respondents).

e. Other includes Roman Catholic (13 respondents), Buddhist (19 respondents), and Other nfd. (2 respondents).

Annexure 2: Fiscal health index (FHI) score for 18 states of India, 2022-23

State	Rank	FHI Score	Category*
Odisha	1	67.8	Achiever
Chhattisgarh	2	55.2	Achiever
Goa	3	53.6	Achiever
Jharkhand	4	51.6	Achiever
Gujarat	5	50.5	Achiever
Maharashtra	6	50.3	Front Runner
Uttar Pradesh	7	45.9	Front Runner
Telangana	8	43.6	Front Runner
Madhya Pradesh	9	42.2	Front Runner
Karnataka	10	40.8	Front Runner
Tamil Nadu	11	29.2	Performer
Rajasthan	12	28.6	Performer
Bihar	13	27.8	Performer
Haryana	14	27.4	Performer
Kerala	15	25.4	Aspirational
West Bengal	16	21.8	Aspirational
Andhra Pradesh	17	20.9	Aspirational
Punjab	18	10.7	Aspirational

Source: NITI Aayog (2025).

Notes: * States have been classified on the basis of the FHI score as

Achiever if FHI score is above 50

Front Runner if FHI score is greater than 40 and less than/equal to 50

Performer if FHI score is greater than 25 and less than/equal to 40

Aspirational if FHI score is less than/equal to 25.

FHI scores have been rounded off to the nearest number for the above classification.

Small finance banks and promotion of financial inclusion in India: Evidence based on efficiency analysis

Rachana Vishwakarma [1] and Anjali Kasture [2]

Abstract

Financial inclusion has been a necessary element of the country's economic development. It assures the delivery of financial services to all section of society deprived of formal financial services. One of the initiatives taken to promote financial inclusion in India includes licensing of small finance bank in 2014. These small finance banks are functioning for the outreach of financial services to underserved and unbanked section of society. This study aims to measure the efficiency of small finance banks in India to examine how far they have succeeded in achieving the goal of financial inclusion since the commencement of their business. Using data from the secondary sources and Data Envelopment Analysis methodology, the study demonstrates that small finance banks have achieved good efficiency scores and have performed well to utilizing their resources, despite various challenges like remote locality, high cost of transactions, and prudential norms. However, regular analysis of efficiency will help the banks to identify the obstacles and improve their efficiency.

JEL Classification Codes: *C61, G21*

1. Introduction

Small Finance Banks (SFBs) play a critical role to extending financial services to underserved and unbanked populations in India. These differentiated banks were given in-principal approval by the Reserve Bank of India (RBI) to provide banking services. The guidelines enabled financial institutions such as Micro Finance Institutions (MFI), Non-Banking Financial Companies (NBFC), and Local Area Banks (LAB) to apply for Small Finance Banks (RBI Guidelines, 2014). Financial inclusion is essential for the economic development for delivery of credible and reasonably priced financial services to all people and business units (Sarma & Pais, 2011). It promotes the access of people to suitable financial services at affordable cost that they can use effectively and take care of their money for their well-being (Allen et al., 2016). It further helps to increase investment levels and risk-bearing capacity for financial shocks (Demirgüç-Kunt et al., 2011). Moreover, financial inclusion substantially enhances the economic development of a country (Ozili & Mhlanga, 2023). It also helps to reduce poverty and improves the condition of marginalized sections of society (Omar & Inaba, 2020).

In India, financial inclusion has seen several stages and witnessed a paradigm shift over time, making the financial sector more approachable and useful to the underprivileged population of the society (Khera et al., 2021). It has expanded from access to a bank account to payment, pension, and insurance as well. Currently, different financial institutions functioning in the country are contributing to the objective of financial inclusion at their respective level (Sahay et al., 2015). The government along with the regulator Reserve

[1] *Assistant Professor, Department of Commerce & Business Studies, Central University of South Bihar, SH-7 Gaya Panchanpur Road, Village- Karhara, Post- Fatehpur, Gaya, Bihar, 824236, E-mail: dr.rachana@cusb.ac.in*

[2] *Research Scholar, Department of Commerce & Business Studies, Central University of South Bihar, SH-7 Gaya Panchanpur Road, Village- Karhara, Post- Fatehpur, Gaya, Bihar, 824236, E-mail: anjali.kasture@gmail.com (Corresponding Author)*

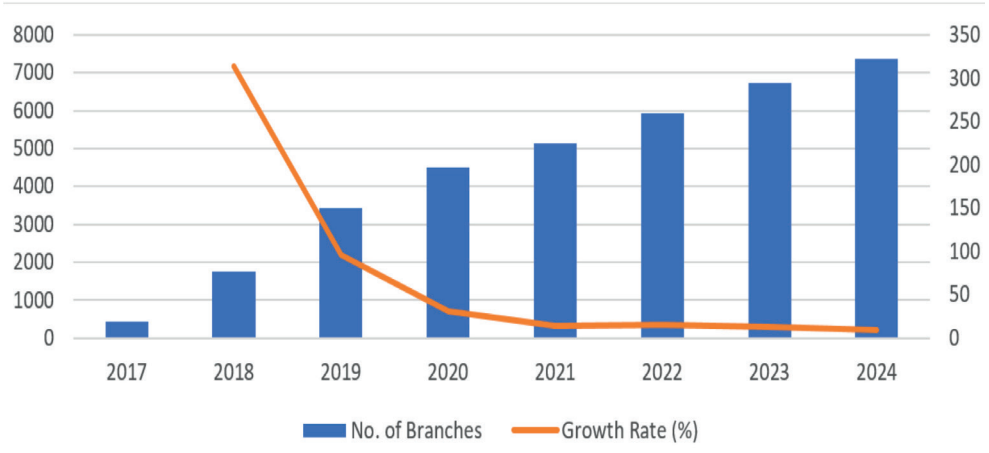
Bank of India (RBI) and other financial institutions has been working for enhancement of financial inclusion. Initially, the aim of financial inclusion was to provide a basic banking account for saving money and making and receiving payments. However, accessibility to a formal bank account does not justify the contribution towards financial inclusion (Sarma, 2008). It also encompasses the accessibility of affordable borrowing and investment opportunities in financial industry to generate more revenue (Agarwala et al., 2023). It is noteworthy to mention that financial inclusion has witnessed a huge upliftment with the introduction of the Pradhan Mantri Jan Dhan Yojana (PMJDY) scheme in the year 2014 which ensures the opening of bank accounts at zero balance (Maity & Sahu, 2020). The annual FI-Index in 2023 was 60.1, 56.4 in 2022, and 53.9 in 2021 respectively, indicating financial exclusion has been on decline (Reserve Bank of India, 2023).

Small Finance Banks have contributed to the expansion of financial inclusion with their key policy of serving underbanked and unbanked populations (Joshi et al., 2021). These banks mostly function in remote areas covering rural and semi-rural areas where accessibility of bank branches is less in number, hence increasing the physical accessibility of bank branches and availability of financial services to marginalized communities in those areas. These banks are established mainly for low-income people to meet their small savings and lending financial needs (Roy & Kumar, 2021). The banks are attracting deposits by providing higher rates of interest on saving accounts and fixed accounts. According to the Report on Trend and Progress of Banking in India by the Reserve Bank of India (2023), the expansion strategy of small finance banks in the country was appreciative as there were 6589 branches of 12 SFBs operating across the nation by the end of June 2023. Further, the credit deposit (C/D) ratio of these SFBs remained flat at around 92 percent, which was higher than Scheduled Commercial Banks (SCBs). As per the annual report of AU Small Finance Bank 2023, more than 7 lakh people were financially included through Jan Dhan Product. At the same time, 304 touchpoints were established in unbanked rural areas. These banks also help in educating people by conducting financial literacy camps to encourage financial awareness. They actively conduct the various program for saving their customer from fraud, digital arrest and financial distress (Reserve Bank of India, 2023).

2. Growth of small finance banks in India

In India, SFBs have shown prominent growth by expanding their branches from 2813 to 6589 during the period from 2018 to 2024 (Figure 1).

Figure 1: Number and growth of small finance bank branches in India



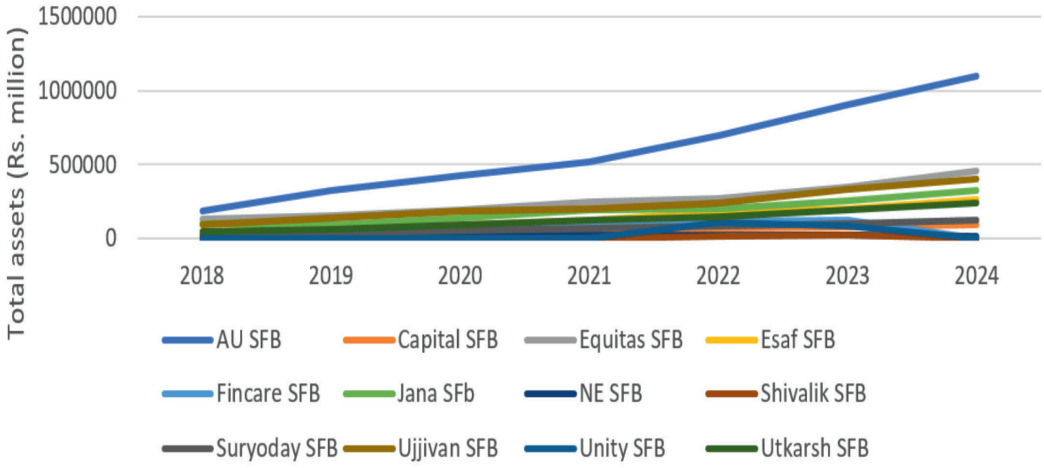
Source: Compiled by authors from RBI database.

The above figure presents the growth of bank branches of small finance banks over time. In 2016, Capital Small Finance Bank commenced its operation with 183 branches and became the first small finance bank in India. The number of branches leaped in the year 2017, and a total of 421 branches were functioning as six more small finance banks began their operation in the country. The figure depicts the expansion pattern of SFBs in India from 2018 to 2023 along with annual growth rate: from 1,740 branches in 2018 to 3,419 in 2019 and surpassed 4,494 in 2020 and further grew to nearly 5,932 in 2022. This expansion in branches signifies the increasing reach of SFBs nationwide and their contribution towards financial inclusion. At the same time, decline in annual growth rate of SFB indicates that although branch network has increased in absolute terms, the expansion rate has slowed progressively. The data indicates that SFBs have considerably enhanced their physical presence, and their growth rates may stabilize as the industry develops. Although the number of bank branches may not seem remarkable as compared to other banking institutions operating in India, considering the location and duration of their operations, these small finance banks are gaining recognition and have a large scope of growth as their target population majorly consist of unorganized market, small borrowers, and Micro, Small and Medium Enterprises (MSMEs). Overall, the business of SFBs is expanding to be beneficial for the rural and unmarginalized populations in connecting them with formal financial services and bringing them under the umbrella of financial inclusion, ultimately contributing to the development of the nation (Maity & Sahu, 2022).

Further, the small finance banks in India have evolved from different backgrounds. For instance, AU small finance bank became largest SFB in the country in 2021 and expanded its outreach with 2505 touchpoints across 21 states and 4 Union Territories till 2025. Capital small finance bank, previously operating as Capital Local Area Bank, became the first small finance bank and has expanded its services across the country. Equitas and ESAF SFBs are growing largely with help of technological advancements. Fincare SFB, now merged with AU SFB, was working with help of technology. North East SFB has focused their expansion in almost 200 locations of northeast region and continuously expanding their outreach. Shivalik and Suryoday SFBs focus on underserved and unserved segments and serving them by increasing their branches in rural and semi-rural areas. Moreover Utkarsh and Ujjivan SFBs serve the marginalized population with their tailored products developed specifically for their needs. Unity SFB started its operations in 2022 and have marked a significant growth within this short time period.

Figure 2 shows variation in assets size and growth pattern across the sector for the period of 2018 to 2024. AU SFB maintains the highest asset base which increases from ₹188,516.6 million to ₹1,095,581.2 million during the period. This reflects high market penetration and operational scalability. Equitas SFB exhibits continuous development and attained total assets of ₹453,038.7 million in 2024. Ujjivan SFB shows a similar trend with a high growth rate during the period. Jana and ESAF SFB exhibits significant assets growth with little variation. North East SFB have shown significant decline in the assets size due to its smaller coverage and less public outreach. Shivalik and Unity are emerging banks which demonstrate smaller assets size due to recent establishment and gradual market growth. These variations show the operational differences among different banks. These variations are accountable for a mix of banks with a long history of MFIs and a strong customer base and wider coverage with recent entries in the market which have less experience.

Figure 2: Total assets of small finance banks



Source: Compiled by authors from Annual Report of SFBs.

3. Contribution of small finance banks (SFBs) to financial inclusion and economic growth

A huge part of economic growth of India relies on the rural development of the country as a large population of the country resides in rural areas (Varshney, 1993). Access to financial services is a vital aspect of rural development since it empowers people, encourages entrepreneurship, and stimulates economic activity in the country (Iqbal & Sami, 2017). The financial requirement of the rural segment is still underserved due to complicated norms and tedious procedures while obtaining credit (Cicchiello et al., 2021). Small finance banks in India address this challenge and offer financial services to micro businesses and lower-income groups residing in rural and semi-rural areas at a minimal cost of the transaction (Kangayan & Dhevan, 2020). Thus, these small finance banks are contributing towards economic growth by reducing inequalities and empowering rural entrepreneurs (Ali & Kaveri, 2021).

Further, small finance banks are working to encourage saving habits in rural and semi-rural areas along with providing small credits for economic activities in the local areas (Roy & Kumar, 2021; Swain, 2023). These banks are encouraging smart banking while paying high interest to customers to increase saving and investment habits. With the main purpose of serving underprivileged and unserved populations, these banks are contributing towards financial inclusion in the country (Neelam, 2019). Moreover, these banks can play a transforming role in building sustainable rural economies, ultimately leading to the overall growth of the country (Ravikumar & Ravikumar, 2019).

In the light of the discussion above, the key objectives of this paper are to answer two policy-related research question: (a) What is the efficiency of small finance banks in promoting financial inclusion? (b) Which banks are most efficient in achieving financial inclusion in India? Methodology and data to achieve these objectives are explained below.

4. Research methodology

4.1. Method

This study uses the technique of Data Envelopment Analysis (DEA) to determine the efficiency of small finance banks. DEA is a non-parametric technique used to measures the efficiency of a decision-making unit (Konar et al., 2022). This technique was developed by Charnes, Cooper, and Rhodes (1978). It has two main models to calculate the efficiency of decision-

making units (DMUs) – the CCR Model (Charnes et al., 1978) and the BCC Model (Banker et al., 1984). The BCC model calculates Pure Technical Efficiency (PTE) on the assumption of Variable Returns to Scale (VRS). In contrast, the CCR model measures the Overall Technical Efficiency (OTE) based on the Constant Return to Scale (CRS) assumption. The scale efficiency is measured by dividing OTE by PTE. This technique measures the efficiency based on scores assigned to DMUs. The efficient DMUs are given a score equal to 1 whereas relatively less efficient DMUs are scored below 1.

Efficiency of DMU is calculated by the ratio of virtual output to virtual input. The relative efficiency score of DMUo is calculated by solving the following optimisation problem.

$$max \frac{\Sigma_{r=1}^{s} v_r y_{ro}}{\sum_{i=1}^{m} u_i x_{io}} \quad (1)$$

Subject to

$$\frac{\Sigma_{r=1}^{s} v_r y_{rj}}{\Sigma_{i=1}^{m} u_i x_{ij}} \leq 1, (j = 1,2,3, \dots, n)$$

$$u_i, v_r \geq 0$$

where,

n = Number of DMUs (indexed by j = 1, 2, …, n)
m = Number of inputs (indexed by i = 1, 2, …, m)
s = Number of outputs (indexed by r = 1, 2, …, s)
xij = Amount of input i used by DMU j
yrj = Amount of output r produced by DMU j
vr = Weight assigned to output r
ui = Weight assigned to input i

We measure the Pure Technical Efficiency (PTE) of small finance banks based on Variable Return to Scale. The PTE describes the efficiency of DMUs in producing maximum output with a given level of input. The efficiency score of each sample small finance bank is calculated and ranks are given to the banks based on their efficiency scores.

4.2. Data

The study measures the efficiency of 12 small finance banks, commenced their operation in 2016. The data is obtained from secondary sources, including the RBI database and annual report of small finance banks available on their websites. The sample data is collected over for a period of seven years, from 2018 to 2024, after the commencement of operation of first small finance bank in 2016. The factors employed for measuring efficiency are explained in Table 1.

Table 1: Variables used for calculation of efficiency scores

Variables	Input	Output
Number of Branches (I1)	Yes	
Number of Employees (I2)	Yes	
Operating Expenses (I3, ₹ in million)	Yes	
Number of ATMs (I4)	Yes	
Fixed Assets (I5, ₹in million)	Yes	
Deposits in Accounts (I6, ₹ in million)	Yes	
Number of Debit Card (O1)		Yes
Loans and Advances (O2, ₹ in million)		Yes
Investment (O3, ₹ in million)		Yes

Source: Authors

The descriptive statistics and correlation coefficients of the variables in Table 1 are given in Annexures. The descriptive statistics (Table A-1) shows a huge variation in the scale of operation of different small finance banks as minimum and maximum values for variables show a huge variation. Further, correlation matrix (Table A-2) shows a positive association among all the variables supports the assumption of isotonicity of data and confirms that there is no increase in output with decrease in input and vice-versa (Golany & Roll, 1989).

5. Results and analysis

Table 2 shows the Pure Technical Efficiency score of selected small finance banks as well as the mean score for the year 2018 to 2024

Table 2: Results of efficiency scores based on BCC model

DMUs	2018	2019	2020	2021	2022	2023	2024	Mean
A U SFB	1	1	1	0.995	1	1	1	0.999
Capital SFB	0.993	0.839	0.841	0.886	0.977	1	1	0.934
Equitas SFB	1	0.794	0.836	0.887	0.924	0.918	0.839	0.885
ESAF SFB	1	1	0.887	0.956	1	1	1	0.977
Fincare SFB	0.895	0.945	1	1	1	1	NA	0.973
Jana SFB	1	0.613	0.742	0.848	0.998	1	1	0.886
North East SFB	1	1	1	0.892	0.917	0.897	0.870	0.939
Shivalik SFB	NA	NA	NA	NA	1	1	1	1
Suryoday SFB	1	1	0.890	1	1	0.944	0.941	0.968
Ujjivan SFB	0.896	0.874	0.916	0.998	1	1	1	0.955
Unity SFB	NA	NA	NA	NA	1	0.922	1	0.974
Utkarsh SFB	1	0.781	0.765	0.816	0.820	0.815	0.782	0.826

Source: Authors' calculations.

The results in Table 2 shows the average range of score lies between 0.8 and 1 which explains that all the banks perform well in achieving the goals of financial inclusion. The efficiency score of AU small finance bank remains 1 except for the year 2021 which was the year affected by COVID 19. Further, Capital SFB, ESAF SFB, Jana SFB, and Ujjivan SFB show prominent progress and exhibit good efficiency score for the entire period. Fincare SFB throughout the life shows high efficiency score. Moreover, Shivalik and Unity SFB exhibit perfect efficiency score although they began their operations in later years. Equitas SFB, North East SFB, Suryoday SFB, and Utkarsh SFB show fluctuation in their efficiency scores. The variation in the efficiency score for different banks is visible in initial years as it increases. This shows that the banks are expanding their business and gaining the efficiency over time. However, most of the banks showed a decline in their efficiency score during 2019-20 on the eve of Covid-19 pandemic.

The fluctuation for different banks during the later period shows that some of the banks lag behind the others. The decline in the efficiency for Capital SFB, Jana SFB, and others might be because these banks did not operate with full efficiency. For instance, North East SFB focuses only on the north east region of the country and does not focus on the entire nation, hence their outreach and customer base might be low as compared to other. AU SFB and Fincare SFB got merged in, and the outreach for AU increases automatically. The mean efficiency score of small finance banks reveals that these banks have performed well in achieving their target. All the SFBs have gained

the efficiency above 0.8 which explains that these banks are able to utilize their resources enabling them to achieve such high scores. It further explains that these banks are able to enhance the financial inclusion by utilizing these resources as the variables included in this study are based on the dimensions of financial inclusion.

Overall, the efficiency of small finance banks ranges between 0.8 and 1 explaining the high efficiency score achieved by the banks during the period of the study. Our study has focused on the variables such as number of branches, number of ATMs, operating expenses, fixed assets, number of employees and deposit in the account as the input variable while the output variables include loans and advances, investments and number of debit cards. All these variables are essential for the financial inclusion measurement. However, the results indicate that some of the banks are able to fully optimize their efficiency such as AU, ESAF, Fincare, Jana and Ujjivan. On the other hand, Capital, Equitas, and North East SFB had shown perfect efficiency score in initial years, but in later years their efficiency score dropped as their operations enlarged along with the competition in the market. In the same way, Utkarsh SFB exhibits full efficiency for the first year but in later years the efficiency score of the bank decreased. The fall in the score shows that the bank was not able to optimize the full resources as compared to other entities in the market. This could be due to higher operating expenses as the banks are expanding their businesses in different location.

Although the small banks are new in the market and have less captured market as compared to public sector and private sector banks in the country, the performance of these banks shows the capacity of the banks in promoting the financial inclusion in the country. These banks have targeted untapped segment of the society which include unserved and underserved population of the society. The results shows that these banks are able to serve these segments with their customized products and services tailored as per the need of the underserved population.

The efficiency of banks helps in achieving the goal of financial inclusion. Efficient banks have low operational cost which ultimately benefits the customer and attracts them with lower fees for obtaining financial services. It also enables the banks to provide better facilities to their customers.

6. Conclusion

Small finance banks work with the objective to promote financial inclusion. These banks have expanded their outreach in almost every state of the country within a short time span. Growth of these small finance banks is low due to their remote location, and existing competition in the market from the public and private banks working for a long time. However, the unmet needs of underserved section of society created opportunity for these banks as they aim to cater the rural and semi-urban population of society.

The efficiency measurement is necessary for SFBs to evaluate the compatibility of banking units in fostering financial inclusion. It helps to comparing the performance of banking units with each other and helps them improve their performance. The result of our analysis, based on DEA methodology, shows that SFBs have high efficiency scores and are able to optimize their resources and promoting the financial inclusion in the country. These results offer evidence for potentiality of small finance banks to promote financial inclusion in the country with their focused target and customized services offered.

The target population of small finance banks includes small business units, small farmers, and unorganized marginalized sectors who are underserved in the structured financial market and the fund requirement of these sectors remains unfulfilled. This creates a potential market for small finance banks to grow. It is also important to note that small finance banks contribute towards the objectives of Pradhan Mantri Jan-Dhan Yojana (PMJDY) and helped to removing a major problem of account dormancy. As a financial

intermediary, these banks contribute in enabling the customers to open bank account with zero balance and allow them to maintain the account with low balance which is an essential goal of PMJDY. This helps in developing saving habits among the marginalized and poor people to start saving with banks. Considering the differences in efficiency, this study may help the management and regulatory bodies to take the necessary steps to facilitate small finance banks in enhancing their performance and extending their services to target sectors.

References:

Agarwala, N., Maity, S., & Sahu, T. N. (2023). Efficiency of Indian banks in fostering financial inclusion: An emerging economy perspective. Journal of Financial Services Marketing. https://doi.org/10.1057/s41264-022-00203-7

Ali, M. S., & Kaveri, V. S. (2021). Small Finance Banks in India: A Review of Performance. Vinimaya, 42(1).

Allen, F., Demirguc-Kunt, A., Klapper, L., & Martinez Peria, M. S. (2016). The foundations of financial inclusion: Understanding ownership and use of formal accounts. Journal of Financial Intermediation, 27, 1–30. https://doi.org/10.1016/j.jfi.2015.12.003

AU Small Finance Bank. (2023). AU Small Finance Bank Annual Report. AU Small Finance Bank.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some Models for Estimating Technical and Scale Efficiency in Data Envelopment Analysis. Management Science, 30(9).

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the Efficiency of Decision Making Units. European Journal of Operational Research, 2, 429–444.

Cicchiello, A. F., Kazemikhasragh, A., Monferrá, S., & Girón, A. (2021). Financial inclusion and development in the least developed countries in Asia and Africa. Journal of Innovation and Entrepreneurship, 10(1), 49. https://doi.org/10.1186/s13731-021-00190-4

Demirgüç-Kunt, A., Córdova, E. L., Pería, M. S. M., & Woodruff, C. (2011). Remittances and banking sector breadth and depth: Evidence from Mexico. Journal of Development Economics, 95(2), 229–241. https://doi.org/10.1016/j.jdeveco.2010.04.002

Golany, B., & Roll, Y. (1989). An application procedure for DEA. Omega International Journal of Management Science, 17(3), 237–250. https://doi.org/10.1016/0305-0483(89)90029-7

Iqbal, B. A., & Sami, S. (2017). Role of Banks in Financial Inclusion in India. Contaduría y Administración, 62(2), 644–656. https://doi.org/10.1016/j.cya.2017.01.007

Joshi, G., Kohli, B., & Nalawade, S. (2021). Are small finance banks acting as catalysts for financial inclusion in India? A phenomenological study. Qualitative Research in Financial Markets, 13(5), 655–671. https://doi.org/10.1108/QRFM-04-2020-0050

Kangayan, S., & Dhevan, K. (2020). A Study on Review of Sustainability of Small Finance Banks in India. Unnayan, 12(2).

Khera, P., Ng, S., Ogawa, S., & Sahay, R. (2021). Measuring Digital Financial Inclusion in Emerging Market and Developing Economies: A New Index. In IMF Working Paper. IMF. https://doi.org/10.1111/aepr.12377

Konar, P., Sinha, R. P., Ghosh, S., & Guha, B. (2022). Fund-based Activity of Indian Small Finance Banks: A Fuzzy DEA Approach. Studies in Microeconomics, 232102222211221. https://doi.org/10.1177/23210222221122159

Maity, S., & Sahu, T. N. (2020). Role of public sector banks towards financial inclusion during pre and post introduction of PMJDY: A study on efficiency review. Rajagiri Management Journal, 14(2), 95–105. https://doi.org/10.1108/RAMJ-03-2020-0009

Maity, S., & Sahu, T. N. (2022). How far the Indian banking sectors are efficient?: An empirical investigation. Asian Journal of Economics and Banking, 6(3), 413–431. https://doi.org/10.1108/AJEB-02-2021-0016

Neelam, A. (2019). Tracking Performance of Small Finance Banks against Financial Inclusion Goals. DVARA Research.

Omar, M. A., & Inaba, K. (2020). Does financial inclusion reduce poverty and income inequality in developing countries? A panel data analysis. Journal of Economic Structures, 9(1), 37. https://doi.org/10.1186/s40008-020-00214-4

Ozili, P. K., & Mhlanga, D. (2023). Why is financial inclusion so popular? An analysis of development buzzwords. Journal of International Development, 36(1), 231–253. https://doi.org/10.1002/jid.3812

Ravikumar, T., & Ravikumar, T. (2019). Small Finance Banks and Financial Inclusion in India. RESEARCH REVIEW International Journal of Multidisciplinary, 3085(03), 2018–2020.

Reserve Bank of India. (2014). Reserve Bank of India Guidelines for Licensing of "Small Finance Banks" in the Private Sector. Reserve Bank of India.

Reserve Bank of India. (2023). Report on Trend and Progress of Banking in India. Reserve Bank of India.

Roy, D., & Kumar, N. K. (2021). Digital Financial Inclusion: Policies and Business Models. National Institute of Bank Management. https://www.nibmindia.org/static/working_paper/NIBM_WP01_DRNKK.pdf

Sahay, R., Cihák, M., N'Diaye, P., & Barajas, A. (2015). Rethinking Financial Deepening: Stability and Growth in Emerging Markets. Journal of Institutional Economics, 17(33), 73–107. https://doi.org/10.18601/01245996.v17n33.04

Sarma, M. (2008). Index of Financial Inclusion. INDIAN COUNCIL FOR RESEARCH ON INTERNATIONAL ECONOMIC RELATIONS.

Sarma, M., & Pais, J. (2011). Financial Inclusion and Development. Journal of International Development, 23(5), 613–628. https://doi.org/10.1002/jid.1698

Swain, S. K. (2023). Role of SFBs in Financial Inclusion: A Critical Review. International Journal of Research Publication and Reviews, 4(3), 1404–1407. https://doi.org/10.55248/gengpi.2023.32544

Varshney, A. (1993). Self-limited empowerment: Democracy, economic development and rural India. Journal of Development Studies, 29(4), 177–215. https://doi.org/10.1080/00220389308422299

Annexures

Table A-1: Descriptive statistics

	Mean	S.D.	Median	Min	Max	Skew	Kurtosis
I1	451.32	268.46	457	30	983	0.162	-1.121
I2	9989.6	8045.89	7605	0	29738	0.582	-0.791
I3	16,900	16,600	12,200	795	96,400	2.125	6.296
I4	196.5467	182.73	144	0	682	0.778	-0.443
I5	1,890	1,680	1,390	127	7,840	1.324	1.695
I6	1,10,000	1,47,000	64,600	5	8,72,000	3.061	10.969
O1	1660393	2160847	670439	0	10263662	1.769	3.246
O2	1,13,000	1,28,000	70,400	8,020	7,32,000	2.565	8.021
O3	34,600	44,700	21,500	1,650	2,71,000	3.027	11.012

Source: Authors' calculations.

Table A-2: Correlation coefficients

	I1	I2	I3	I4	I5	I6	O1	O2	O4
I1	1								
I2	0.719	1							
I3	0.657	0.870	1						
I4	0.639	0.618	0.725	1					
I5	0.500	0.779	0.861	0.689	1				
I6	0.559	0.726	0.925	0.646	0.803	1			
O1	0.566	0.507	0.481	0.688	0.273	0.314	1		
O2	0.616	0.820	0.976	0.717	0.861	0.969	0.412	1	
O3	0.524	0.744	0.947	0.648	0.844	0.955	0.371	0.976	1

Source: Authors' calculations.

Provisioning, maintenance, and utilization of sanitation infrastructure in government schools of Karnataka: Insights from a field survey

Arunkumar R. Kulkarni [1], Nayanatara S. Nayak [2], N. S. Mugadur [3], Dattatreya R. Revankar [4] and Dundappa Y. Badlakkanavar [5]

Abstract

This paper examines the status, usage, functionality, and maintenance of sanitation facilities in selected government schools across districts in Karnataka. It is based on primary data collected during the 2023–24 academic year as part of a larger study on the Swachh Bharat Mission–Grameen (SBM-G) in Karnataka. The data was gathered from 63 government schools located in 48 villages in Karnataka state. The findings reveal that all the surveyed schools have separate toilet facilities for boys and girls, with high utilisation among girls. However, issues persist with toilet repair, maintenance, and the regular supply of water. These challenges underscore the urgent need for sustained attention to the upkeep of sanitation infrastructure in government schools. To advance the vision of Viksit Bharat 2047, the government must enhance resource allocation not only for the construction but also for the regular maintenance of school sanitation facilities. Ensuring hygienic and accessible infrastructure is essential for creating safe and supportive learning environments, ultimately empowering students to become healthy and confident contributors to a developed and inclusive India.

JEL Classification Codes: *I18, I25, H75, I28, R53*

1. Introduction

Access to adequate and well-maintained sanitation facilities in schools is fundamental to ensuring a safe, healthy, and inclusive learning environment for children. Provision of sanitation in schools is not merely a matter of infrastructure but a critical component of public health, gender equity, and educational quality (WHO & UNICEF, 2022). Absence of proper sanitation facilities, particularly for girls, contributes to absenteeism, health issues, and in some cases, permanent dropouts, especially during menstruation. Schools equipped with adequate Water, Sanitation, and Hygiene (WASH) facilities provide a safe and nurturing setting that supports effective learning. If basic hygiene needs are met, students are enabled to concentrate on their studies without the risk of illness. Thus, ensuring proper WASH infrastructure in all the schools is essential to create a healthy and inclusive learning environment for every child.

The provision of sanitation in schools initially received limited attention, especially in rural and remote areas. The early focus was primarily

[1] *Assistant Professor, Centre for Multi-Disciplinary Development Research, Dharwad, Karnataka, India. Email: ark.cmdr@gmail.com*

[2] *Professor, Centre for Multi-Disciplinary Development Research, Dharwad, Karnataka, India. Email: nsn.cmdr@gmail.com*

[3] *Associate Professor, Dept of Economics, Karnatak University, Dharwad. Email: drnsmugadur@kud.ac.in*

[4] *Research Assistant, Centre for Multi-Disciplinary Development Research, Dharwad, Karnataka, India. Email: drr.cmdr@gmail.com*

[5] *Assistant Professor, Centre for Multi-Disciplinary Development Research, Dharwad, Karnataka, India. Email: dundappa45@gmail.com*

on increasing school enrolment and expanding infrastructure, such as classrooms, rather than on sanitation facilities. However, with increasing awareness about the role of hygiene in education and health, both state and central governments initiated targeted programs to improve WASH infrastructure in educational institutions. The Total Sanitation Campaign (TSC) launched by the Government of India in 1999 marked a turning point by according priority for school sanitation. Karnataka, being one of the leading states in implementing the central assistance schemes, started integrating toilet construction with school development plans. The TSC was restructured into the Nirmal Bharat Abhiyan (NBA) in 2012, which further stressed the need for functional toilets and behavioural change (Kulkarni, 2022). Karnataka made progress by increasing toilet coverage and involving Panchayati Raj Institutions and School Development and Monitoring Committees (SDMCs) in sanitation efforts. This was further strengthened by the Swachh Vidyalaya Abhiyan launched in 2014 under the Swachh Bharat Mission (SBM), which aimed to ensure that every school had functional and separate toilets for boys and girls (Department of School Education & Literacy, 2019; Rural Drinking Water and Sanitation Department (n.d)). Further, in 2014, separate toilets were mandated in all states by the Supreme Court under the provisions of the RTE Act. The initiative received widespread support from the government departments, corporates, and civil society, resulting in the rapid construction of toilet facilities across the country. After Samagra Shiksha Abhiyan, the Sarva Shiksha Abhiyan (SSA) was launched in 2001. It emphasized the need for basic infrastructure in schools, including separate toilets for boys and girls based on the norms laid down by the Bureau of Indian Standards (BIS) (The New Indian Express, 2013; Press Information Bureau, 2013). This helped to increase awareness and funding for sanitation infrastructure in schools.

In Karnataka, these national initiatives related to provision of sanitation have been actively implemented and supplemented by state-level efforts through the Department of School Education and Literacy and the Rural Development and Panchayat Raj (RDPR) Department, focusing on sustainability, menstrual hygiene management, and hygiene education. Collectively, these programmes have contributed to remarkable improvements in school sanitation coverage and functionality in the state over the period. Table 1 shows the progress of sanitation facilities in Karnataka.

Table 1: Variables used for calculation of efficiency scores

Schools by Type	Percent of schools with			
	Boy's Toilet Facility	Functional Boy's Toilet Facility	Girl's Toilet Facility	Functional Girl's Toilet Facility
All Management	97.3	96.2	99.2	98.6
Government	96.1	94.5	98.9	98.1
Govt Aided	99.5	99.4	99.9	99.8
Private Unaided	99.6	99.4	99.7	99.6
Others	100.0	100.0	100.0	100.0

Source: GoI, MoE-DSEL (2024).

Note: Others include Kendriya Vidyalaya, Jawahar Navodaya Vidyalayas (JNVs), Schools Run by Local Bodies, Schools Run by Public Sector Undertakings (PSUs), Residential Schools, and NGO / Religious trust schools.

Table 1 highlights the status of toilet facilities across different types of schools in India during 2023–24. Overall, the availability of toilet facilities is high, with 97.3 per cent of schools having boys' toilets and 99.2 per cent having girls' toilets. However, a slight gap exists between availability and functionality, especially for boys' toilets (96.2% functional). Government schools show the lowest performance, with only 94.5 per cent having functional boys' toilets, indicating challenges in maintenance despite decent availability. In contrast, government-aided and private unaided schools report over 99 per cent availability and functionality for both boys' and girls' toilets, reflecting better infrastructure management. Schools under the "Others" category, including Kendriya Vidyalayas, Jawahar Navodaya Vidyalayas (JNVs), schools run by local bodies, public sector undertakings (PSUs), residential schools, and NGO/religious trust schools, demonstrate 100 percent availability and functionality, likely due to centralized management and better resource allocation. Notably, girls' toilet facilities are better maintained across all school types, suggesting targeted efforts to support girl child education.

Despite significant achievements in expanding sanitation infrastructure, several challenges persist on the ground, like non-functional toilets and poor maintenance, irregular cleaning, and inadequate water supply. The gap in access to clean and functional toilets in government schools has direct implications for students' health, safety, and academic engagement. The absence of menstrual hygiene facilities further exacerbates the challenges faced by adolescent girls, often leading to lower attendance and compromised learning outcomes. The Karnataka High Court has stressed the immediate need for ensuring adequate toilet and drinking water facilities in schools throughout the state, and such basic shortcomings should not hinder students' right to quality education (The Law Advice, 2023).

School sanitation is a key component in achieving multiple United Nations Sustainable Development Goals (SDGs), particularly SDG 3 (Good Health and Well-being), SDG 4 (Quality Education), and SDG 6 (Clean Water and Sanitation) (United Nations, n.d.). Furthermore, the SDGs are closely aligned with the Government of India's vision of Viksit Bharat (Developed India) by 2047. The SDG India Index 2023–24, developed by NITI Aayog, positions Karnataka as a Front Runner in SDG 6, with an index score of 90, indicating significant progress in water and sanitation access. Nationally, 94.7 per cent of schools have functional toilets for girls, whereas in Karnataka, 97.9 per cent of schools have functional toilets for girls (NITI Aayog, 2024). The better performance in the coverage of girls' toilets reflects the impact of initiatives such as the Sarva Shiksha Abhiyan (SSA), Swachh Bharat Mission (Grameen) and other previous sanitation programmes. However, disparities in the provision of toilets across states persist. The Karnataka Human Development Report 2022 highlights that the rural districts such as Kalaburagi, Yadgir, Ballari, and Raichur continue to struggle with inadequate sanitation infrastructure in schools, particularly the lack of separate toilets for girls (Government of Karnataka, 2022). These regional disparities have direct implications for students' attendance, learning outcomes, health, and gender equity. Addressing these challenges is essential not only for fulfilling SDG targets but also for laying a strong foundation for a clean, inclusive, and developed India by 2047.

In the above context, the present paper aims to evaluate the provisioning, maintenance, and utilization of sanitation infrastructure in selected government schools across rural districts of Karnataka, based on primary data from 63 schools in 48 villages. The paper provides actionable recommendations to strengthen sanitation outcomes in schools.

2. Methodology

The present study is based on primary data collected under the ICSSR-sponsored research project titled "Swachh Bharat Abhiyan–Grameen (SBM-G): Achievements, Impacts, and Challenges – A Study of Select Areas of Karnataka." To ensure adequate geographical representation, a multi-stage random sampling technique was adopted to select the villages for obtaining the data related to rural sanitation. In the first stage, three districts were randomly selected from each of Karnataka's four administrative divisions, resulting in the selection of twelve districts. In the second stage, two taluks were randomly selected from each of the chosen districts, leading to the selection of twenty-four taluks. In the final stage, two villages were randomly selected from each of the selected taluks, culminating in a total of 48 villages across the state. To assess the school sanitation, all government schools located within the selected villages were included in the study. As a result, 63 educational institutions were covered. The sample included a variety of government school types catering to different levels of education. Data collection was carried out using structured questionnaires administered to the headmasters of the selected schools. The questionnaire was designed to gather comprehensive information on the provisioning, maintenance, and utilization of sanitation facilities in schools. The data collection was carried out during the months of November and December 2023. Table 2 presents the distribution of sample schools by the education level in Karnataka.

Table 2: Sample size of schools by levels of education in Karnataka

Districts/ Divisions	No of Schools				Percentage of Schools			
	High School	Higher Primary	Lower Primary	Total	High School	Higher Primary	Lower Primary	Total
Ballari		4		4	0.0	100.0	0.0	100.0
Kalaburgi	2	3		5	40.0	60.0	0.0	100.0
Raichur	2	3	1	6	33.3	50.0	16.7	100.0
Kalaburgi Division	4	10	1	15	26.7	66.7	6.7	100.0
Bagalkot		5	1	6	0.0	83.3	16.7	100.0
Belagavi	1	4	3	8	12.5	50.0	37.5	100.0
Uttara Kannada	2	4	3	9	22.2	44.4	33.3	100.0
Belagavi Division	3	13	7	23	13.0	56.5	30.4	100.0
North Karnataka	7	23	8	38	18.4	60.5	21.1	100.0
Chamarajanagar		5		5	0.0	100.0	0.0	100.0
Chikkamagaluru		4		4	0.0	100.0	0.0	100.0
Mysuru		3	1	4	0.0	75.0	25.0	100.0
Mysuru Division		12	1	13	0.0	92.3	7.7	100.0
Chikkaballapura		4		4	0.0	100.0	0.0	100.0
Davanagere	3	1		4	75.0	25.0	0.0	100.0
Tumakuru		4		4	0.0	100.0	0.0	100.0
Bengaluru Division	3	9		12	25.0	75.0	0.0	100.0
South Karnataka	3	21	1	25	12.0	84.0	4.0	100.0
Grand Total	**10**	**44**	**9**	**63**	**15.9**	**69.8**	**14.3**	**100.0**

Source: Authors' survey data.

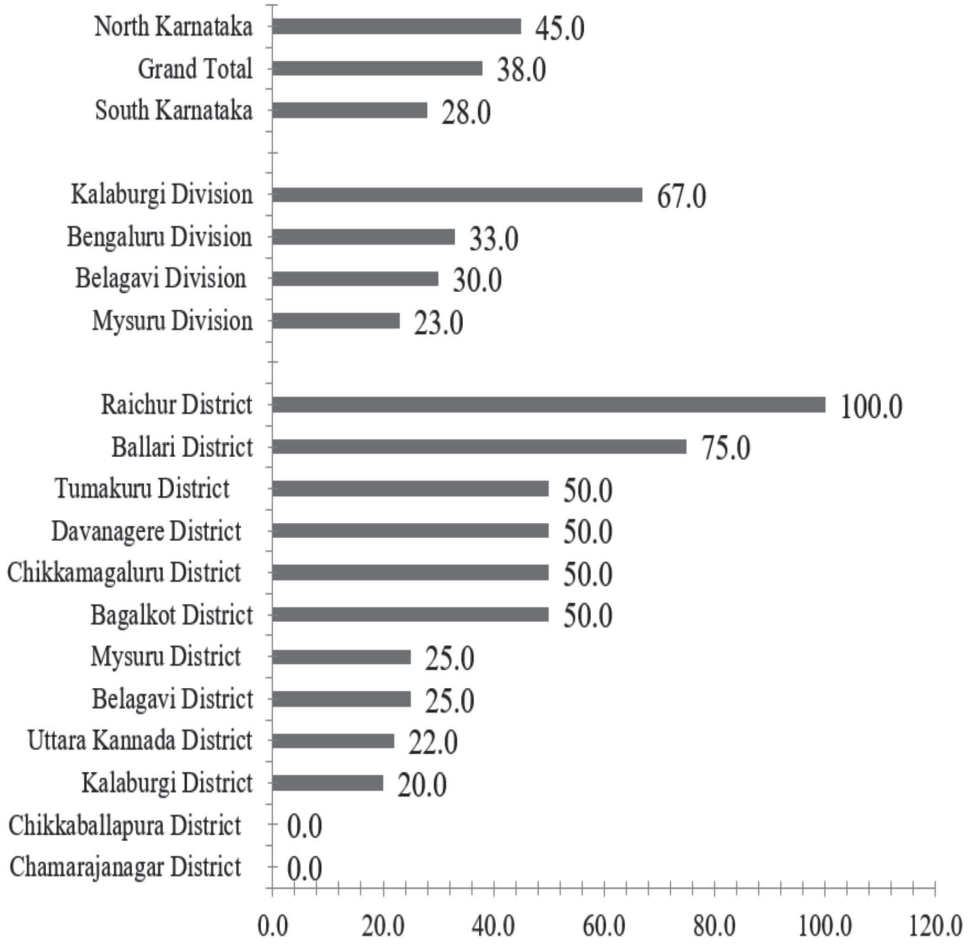
Table 2 shows that in the selected 48 villages, there were a total of 63 educational institutions comprising lower primary, higher primary, and high schools. The proportion of higher primary schools was the highest (69.8 per cent), followed by high schools (15.9 per cent) and lower primary schools (14.3 per cent). There were variations across districts and administrative divisions in the spread of sample educational institutions.

3. Findings of the study

3.1. Provision of toilets in schools

It is well known that the provision of toilets in schools is a critical component of ensuring a safe, hygienic, and inclusive learning environment, especially in rural and underserved areas. Access to clean and functional toilet facilities directly impacts students' health, attendance, and overall well-being, with a significant effect on girls' participation in education. It is found that the schools in all the selected villages have toilet facility constructed either under the Sarva Shiksha Abhiyan (SSA), Madhyamik Shiksha Abhiyan (MSA), SBM-G or through other sources including own resources. This reveals the commitment of the government to provide toilets to create a conducive environment for learning and growth. Figure 1 shows the provision of sanitation facilities in schools in selected areas facilitated under SBM-G.

Figure 1: Provision of sanitation facility in schools under SBM-G (% of Schools)

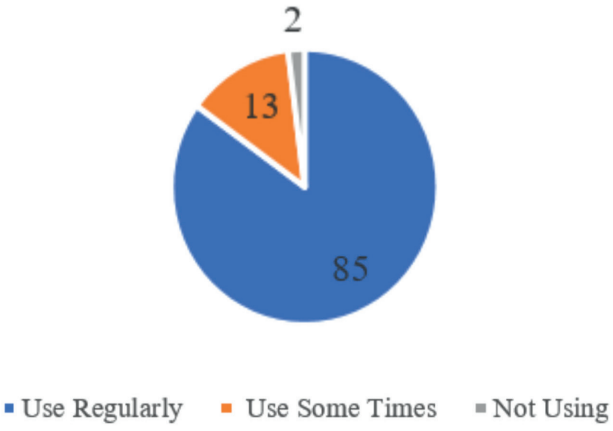


Source: Authors' survey data.

Figure 1 shows that, on an average, 38 per cent of the schools have been provided with sanitation facilities under SBM-G in selected areas. There are variations in the proportions of schools provided with sanitation facilities under SBM-G across the districts and administrative divisions. In North Karnataka, 45 percent of schools received sanitation facilities, compared to only 28 percent in South Karnataka. At the divisional level, Kalaburagi Division shows the highest provision (67%), while Mysuru Division lags at just 23 per cent. Among districts, Raichur stands out with a full 100 per cent coverage, followed by Ballari (75%), while Chikkaballapura and Chamarajanagar have no coverage (0%). Several districts including Tumakuru, Davanagere, Chikkamagaluru, and Bagalkot report a moderate coverage of 50 per cent. In contrast, districts like Kalaburgi (20%), Uttara Kannada (22%), Mysuru (25%), and Belagavi (25%) are on the lower end. The schools in Chamarajanagar, Chikkaballapur, Kalaburagi, Uttara Kannada, Belagavi, and Mysuru districts have already been provided with toilets under schemes such as Sarva Shiksha Abhiyan (SSA), Madhyamik Shiksha Abhiyan (MSA), SBM-G, or through other sources, including their own resources, prior to the launch of SBM-G. This indicates the progression of these schools and their hygiene practices. Thus, SBM-G is primarily contributed to improving sanitation facilities in previously underserved areas.

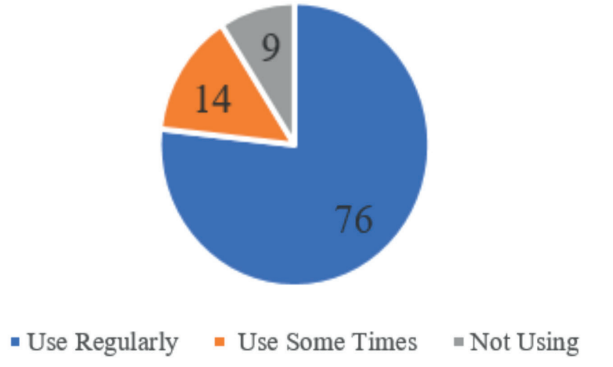
Provisioning of sanitation facilities in schools is as important as their proper utilisation. Encouraging students, especially girls, to confidently use these facilities requires not only availability but also awareness, cleanliness, privacy, and safety. Promoting utilisation through hygiene education and regular monitoring is essential for building a healthier student population and for advancing the goals of Swachh Bharat and Viksit Bharat 2047. Figure 2 and Figure 3 show the extent of sanitation infrastructure (toilet/urinals) usage by girls and boys in the selected schools. Among the girls, 85 per cent use sanitation infrastructure regularly, 13 per cent use them occasionally, and only 2 per cent do not use the toilets at all. In comparison, among the boys, 76 per cent use sanitation infrastructure regularly, 14 per cent use them occasionally, and 9 per cent do not use the sanitation infrastructure at all. This indicates that sanitation infrastructure usage among girls is higher compared to boys. These figures suggest better toilet usage habits among girls compared to boys, indicating a greater awareness, comfort, or access to sanitation facilities among female students.

Figure 2: Use of toilet among girls (%)



Source: Authors' survey data.

Figure 3: Use of toilet among boys (%)



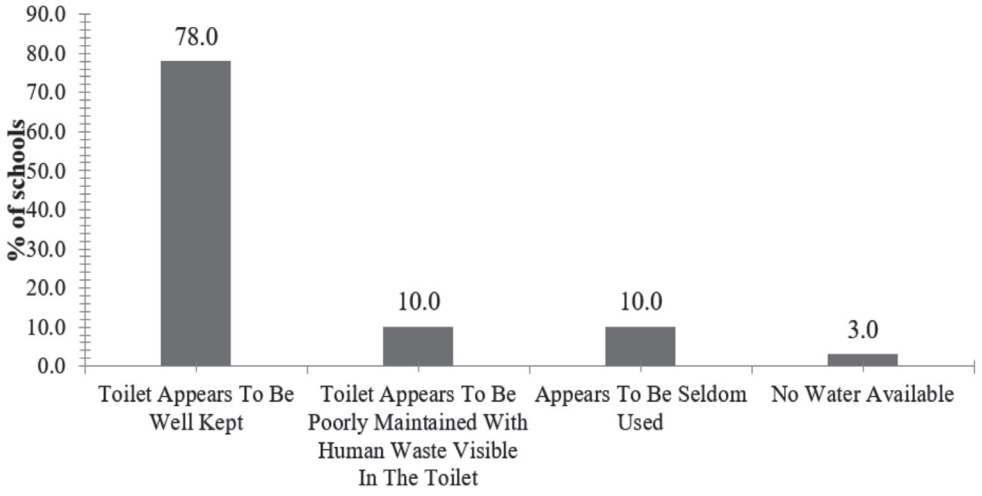
Source: Authors' survey data.

3.2 Maintenance of sanitation in schools

Maintenance of sanitation in schools is crucial, not only for the health and safety of students and teachers but also for creating an environment

that supports learning, fosters responsibility, and promotes a positive school culture. Effective use of toilets ensures hygiene, reduces the risk of disease transmission, and fosters a clean school environment. It also reinforces good sanitation habits among children, which they carry into their homes and communities. Without a regular use and maintenance, even well-constructed toilets can fall into disrepair, becoming unusable and defeating their purpose. Hence, the functionality and usage status of toilets reveal the importance given to sanitation aspects in schools. Figure 4 shows the functionality of the toilets in selected schools.

Figure 4: Functionality of toilet facility



Source: Authors' survey data.

Figure 4 depicts that 78 per cent of schools have well-maintained, clean, and properly functioning toilets. In general, such schools prioritize sanitation and hygiene, creating a conducive environment for students and staff to use the facilities comfortably and safely. About 10 per cent of schools have poorly maintained toilets with a visible human waste. This indicates neglect or inadequate cleaning practices, posing health risks and discomfort to users and potentially leading to reluctance in using the facilities. In about 10 per cent of schools, toilets appear to be seldom or rarely used due to various reasons, including functionality issues. In about 3 per cent of schools, no water is available for toilets, rendering them unusable. This lack of water availability prevents their use. Overall, a significant proportion of schools maintains clean toilets. At the same time, a notable proportion face challenges such as poor maintenance and water scarcity. Table 3 shows district-wise functionality of toilets in selected schools, indicating variations across districts/ regions in selected areas.

Table 3: Functionality of the toilet (% of schools)

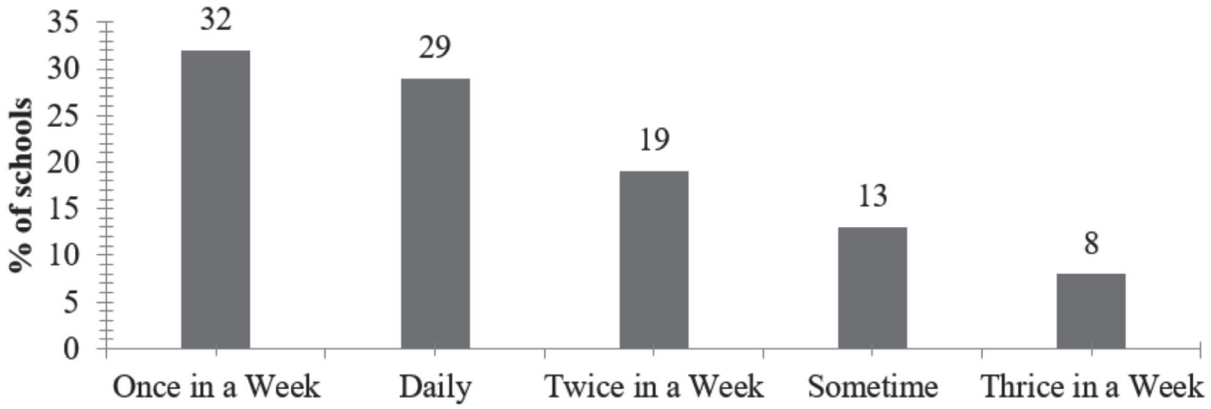
District/ Divisions	Percent of schools with				
	No water available	Toilet appears to be well kept	Toilet appears to be poorly maintained with human waste visible in the toilet	Appears to be seldom used	Grand total
Ballari	25.0	75.0	0.0	0.0	100.0
Kalaburgi	0.0	80.0	20.0	0.0	100.0

District/ Divisions	Percent of schools with				
	No water available	Toilet appears to be well kept	Toilet appears to be poorly maintained with human waste visible in the toilet	Appears to be seldom used	Grand total
Raichur	0.0	83.0	17.0	0.0	100.0
Kalaburgi Division	**7.0**	**80.0**	**13.0**	**0.0**	**100.0**
Bagalkot	17.0	67.0	0.0	17.0	100.0
Belagavi	0.0	88.0	0.0	13.0	100.0
Uttara Kannada	0.0	78.0	0.0	22.0	100.0
Belagavi Division	**4.0**	**78.0**	**0.0**	**17.0**	**100.0**
North Karnataka	**5.0**	**79.0**	**5.0**	**11.0**	**100.0**
Chamarajanagar	0.0	100.0	0.0	0.0	100.0
Chikkamagaluru	0.0	100.0	0.0	0.0	100.0
Mysuru	0.0	50.0	50.0	0.0	100.0
Mysuru Division	**0.0**	**85.0**	**15.0**	**0.0**	**100.0**
Chikkaballapura	0.0	100.0	0.0	0.0	100.0
Davanagere	0.0	25.0	50.0	25.0	100.0
Tumakuru	0.0	75.0	0.0	25.0	100.0
Bengaluru Division	0.0	67.0	17.0	17.0	100.0
South Karnataka	0.0	76.0	16.0	8.0	100.0
Grand Total	**3.0**	**78.0**	**10.0**	**10.0**	**100.0**

Source: Authors' survey data.

Regular cleaning of school toilets is essential to maintain hygiene, prevent the spread of infections, and ensure the well-being of students and staff. Unclean toilets can discourage students, especially girls, from using them, leading to absenteeism and health issues such as urinary tract infections and gastrointestinal diseases. Clean and well-maintained toilets promote a sense of dignity, safety, and comfort, contributing to a more positive learning environment. Moreover, they reflect the school's commitment to health and sanitation, reinforcing the importance of cleanliness among students. Ensuring daily cleaning routines and proper supervision is not just a matter of facility management. It is a key step towards achieving the objectives of Swachh Vidyalaya and the broader vision of Viksit Bharat 2047. Figure 5 shows the frequency of toilet cleaning in selected schools. It reveals that in 29 per cent of schools, toilets are cleaned daily and at varying frequency in other schools. Overall, a higher proportion of schools lack consistent and regular cleaning schedules, which are essential for maintaining hygienic environments conducive to the well-being of students.

Figure 5: Frequency of toilet cleaning in selected schools per week



Source: Authors' survey data.

3.3. Challenges in sanitation maintenance

Despite notable improvements in the provision of sanitation infrastructure under the Swachh Bharat Mission-Grameen (SBM-G), the maintenance and upkeep of these facilities remain a major challenge in government schools across rural Karnataka. The school headmasters and teachers are mainly responsible for the maintenance of sanitation infrastructure including provision of water, although they are already overburdened with multiple responsibilities such as mid-day meal supervision, administrative duties, and academic instruction, etc. With limited time and capacity, regular sanitation monitoring and toilet maintenance often receive inadequate attention. This pattern was observed in almost all the sample schools.

Another major constraint in maintenance is insufficient funding. Government of Karnataka has recently revised school maintenance grants based on student strength (The New Indian Express, 2023). That is, Rs.20,000 for schools with up to 50 students, Rs.28,000 for 100 students, Rs.33,000 for 500 students, and Rs.45,000 for schools with over 500 students. These funds are not exclusively meant for sanitation. Teachers are expected to allocate a portion of the general school maintenance grant for toilet upkeep, which often proves inadequate for covering cleaning supplies, minor repairs, and hiring cleaning staff. As a result, sanitation maintenance is frequently neglected. The availability of water for sanitation is also a critical aspect of ensuring proper hygiene and sanitation practices. Without access to a reliable water supply, maintaining cleanliness and carrying out essential sanitation activities becomes challenging. On an average, 92 per cent of schools have a constant supply of water, while the remaining 8 per cent of schools do not have a constant supply of water for sanitation purposes. Schools in districts like Ballari, Uttara Kannada, Mysuru, Davanagere and Tumakuru have water problems for sanitation purposes and water supply and required water storage facilities need to be ensured in all the government schools.

The shortage of separate cleaning personnel further exacerbates the issue. Many schools report difficulty in hiring individuals willing to clean toilets, especially in remote rural areas. This shortage not only affects the cleanliness of toilets but also contributes to the gradual deterioration of infrastructure, making some facilities unusable over time. In a few instances, toilets remain locked due to non-availability of cleaning staff. In this context, Karnataka government has issued a formal ban on using students for cleaning toilets, reiterating that maintenance grants and the

SDMCs must be utilized to hire local help for this purpose. In response to these issues, the SDMC forum has proposed inclusive mass sanitation programs involving teachers, students, parents, and local governments. They recommend that 'Sanitation Saturdays' be institutionalized for weekly cleanliness drives that promote collective responsibility while instilling hygiene values in students. The forum also advocates for increased grants, cleaning materials, and the deployment of support staff under schemes like MGNREGA to assist with sanitation efforts.

4. Conclusion and recommendations

This paper shows the progress towards providing sanitation facilities in schools across Karnataka. However, gaps persist, particularly in the maintenance of infrastructure and the provision of a continuous water supply. Since 2014, the Swachh Bharat Mission -Grameen (SBM-G) has made notable strides in improving sanitation infrastructure in schools. Addressing the remaining challenges requires a multi-pronged approach, including the following:

- Strengthening Institutional Support: Gram Panchayats may take responsibility for the construction and maintenance of school sanitation infrastructure, including ensuring a continuous water supply. This will reduce the burden on school staff, allowing them to focus on academic activities. School Development and Monitoring Committees (SDMCs) may also ensure proper upkeep of these facilities.
- Water Security: Water management infrastructure to be integrated to ensure an uninterrupted water supply. Gram Panchayats may play a key role in guaranteeing continuous access to water in schools.
- Regular Monitoring: District-level audits of school sanitation facilities to be implemented to ensure transparency and accountability.
- Adequate Funding: The government may enhance maintenance grants for all schools, with specific allocations exclusively for sanitation upkeep.

In short, sustainable sanitation facilities in schools go beyond mere infrastructure. It requires ongoing institutional support, inclusive and participatory practices, and shared responsibility among stakeholders. It encompasses providing safe, accessible, and well-maintained water, sanitation, and hygiene (WASH) facilities, while also educating students and staff about proper hygiene practices. This approach ensures a healthy learning environment and promotes long-term behavioural changes. Implementing comprehensive hygiene education programs that cover topics like handwashing, toilet etiquette, and menstrual hygiene management (for girls at appropriate age) right at primary school level can inculcate hygiene practices among children at a young age. And, ensuring that all sanitation facilities are well-maintained is also a key to sustenance of the program. Repairs and timely restocking of supplies should be inbuilt in the program right from the initiation.

A clean and well-maintained school environment is essential for children's health, regular attendance, and holistic development, and must be treated as a policy priority at all levels of governance. Aligning with the vision of Viksit Bharat@2047, ensuring sustainable school sanitation is a foundational step towards building a healthy, educated, and empowered young population. These can lead to India's journey towards becoming a developed nation.

Acknowledgement

This paper is based on the findings of the research project titled "Swachh Bharat Abhiyan - Grameen (SBM-G): Achievements, Impacts, and Challenges – A Study of Select Areas of Karnataka", sponsored by the Indian Council of Social Science Research (ICSSR), Government

of India, New Delhi, and undertaken at Centre for Multi-disciplinary Development Research (CMDR) at Dharwad (Karnataka State). We acknowledge and thank the ICSSR for its financial support. The findings, interpretations, and conclusions expressed in this paper are entirely those of the authors and do not necessarily reflect the views of the ICSSR or CMDR.

References

Department of School Education & Literacy. (2019). Swachh Vidyalaya: A national mission on school sanitation. Ministry of Human Resource Development, Government of India. https://dsel.education.gov.in/sites/default/files/2019-05/swt_doc.pdf

Government of India, Ministry of Education, Department of School Education & Literacy. (2024). UDISE+ 2023–24: Unified District Information System for Education Plus report. https://udiseplus.gov.in/

Government of Karnataka. (2022). Karnataka human development report 2022. Planning, Programme Monitoring and Statistics Department. https://planning.karnataka.gov.in/storage/pdf-files/Reports/HumanDevelopmentReport-2022FullBook.pdf

Govt of Karnataka, Rural Drinking Water and Sanitation Department. (n.d.). Swachhameva Jayate: Sanitation. https://english.swachhamevajayate.org/sanitations/

Kulkarni, A. R. (2022). Rural sanitation in India: Policies, programmes and achievements. Indian Journal of Public Administration, 68(4), 691–704. https://doi.org/10.1177/00195561221134762

Ministry of Education, Government of India. (2023). Unified District Information System for Education Plus (UDISE+) Report 2023–24.

NITI Aayog. (2024, July 12). SDG India Index 2023–24: Fourth edition measuring state and union territory performance on the Sustainable Development Goals. Government of India. https://www.niti.gov.in/sites/default/files/2024-07/SDG_India_Index_2023-24.pdf

Press Information Bureau. (2013, March 6). Provision of toilet facilities in schools. https://www.pib.gov.in/newsite/PrintRelease.aspx?relid=93299

The Law Advice. (2023, July 18). School facilities crisis unveiled: Karnataka HC slams government's neglect of toilets and drinking water. https://www.thelawadvice.com/news/school-facilities-crisis-unveiled-karnataka-hc-slams-government-s-neglect-of-toilets-and-drinking-water

The New Indian Express. (2013, March 10). Norms for school toilets. https://www.newindianexpress.com/states/karnataka/2013/Mar/10/norms-for-school-toilets-457244.html

The New Indian Express. (2023, December 31). Puran Choudhary: Revised maintenance grants for schools in Karnataka.

Toilet Board Coalition. (2023). Accelerating business solutions to school sanitation. https://www.toiletboard.org/wp-content/uploads/2023/03/Accelerating-Business-Solutions-to-School-Sanitation.pdf

United Nations. (n.d.). Clean water and sanitation – Goal 6. United Nations Sustainable Development. https://www.un.org/sustainabledevelopment/water-and-sanitation/

WHO & UNICEF. (2022). Joint Monitoring Programme (JMP) for Water Supply, Sanitation and Hygiene (WASH): Progress on drinking water, sanitation and hygiene in schools: 2000–2021 data update. https://data.unicef.org/resources/jmp-wash-in-schools-2022/

A comparative study of economic well-being among banking and non-banking individuals in Bengaluru

Asha Joseph [1] and Maria Immanuvel S [2]

Abstract

This study examines the role of banking access in influencing individuals' economic well-being (EWB). It focuses on a comparative analysis of individuals with and without access to banking services to evaluate the relationship between financial inclusion and perceived economic stability. The research adopts a demand-side analysis, utilizing a sample of 390 respondents from Bengaluru Urban District. Statistical analyses, including binary logistic regression, independent t-tests effect size measures, are performed to compare the EWB scores of bank users and non-users and to examine if access to banking services predicts an individual's economic well-being. The results reveal that individuals with bank accounts report significantly higher EWB scores compared to non-users. The findings suggest that banking access is strongly associated with individuals' confidence in meeting their financial needs and achieving economic security. The study underscores the transformative potential of financial inclusion policies in bridging gaps in economic stability and reducing vulnerabilities, particularly among under banked populations.

JEL Classification Code: *G2*

1. Introduction

Economic well-being (EWB) is a crucial measure of an individual's financial stability, encompassing more than just income levels. It reflects the capacity to meet immediate needs, plan for future financial goals, and cope with unforeseen monetary setbacks (Council on Social Work Education, 2016). In the Indian context, access to formal banking services plays a pivotal role in shaping economic well-being, as it provides essential tools such as savings accounts, access to credit, and mechanisms for risk management. However, despite notable progress in financial inclusion initiatives, a significant proportion of the population particularly within lower-income and rural communities remains excluded from the banking system (Nandru et al., 2021; Osberg & Sharpe, 2002). This exclusion poses a challenge to achieving broader financial stability, inclusion and equitable economic development.

Economic well-being has long been recognized as an essential indicator of an individual's financial security and ability to cope with life's uncertainties (Diener, 1984). It reflects the ability not only to meet immediate needs but also to plan for future financial goals and withstand unexpected economic shocks. In recent years, financial inclusion has emerged as a critical driver of economic well-being, particularly for underserved and marginalized populations. Financial inclusion provides individuals with access to banking services, credit, and insurance, enabling them to manage their finances more effectively and build financial resilience (Demirguc-Kunt & Klapper, 2013).

Sarma (2008) argues that access to banking services is central to financial inclusion, fostering improved financial outcomes. Similarly, Allen et al. (2012) highlight the role of banking access in enhancing financial stability for lower-income groups by providing credit, savings mechanisms,

[1] *Research Scholar, Department of Commerce, St. Joseph's Institute of Management, Bengaluru, E-mail : ashajoseph@sjcc.edu.in*

[2] *Assistant Professor, Department of Commerce, St. Joseph's Institute of Management, Bengaluru*

and risk management tools. Accessibility to financial services has been emphasized over financial literacy as a determinant of financial inclusion, particularly in developing countries (Ghosh, 2012; Bongomin et al., 2016). Financial literacy, while important, has been found to have a limited role in driving financial outcomes among marginalized populations when compared to direct access to banking services.

Recent studies have explored the influence of financial inclusion on economic well-being across various demographic and regional contexts. For instance, Park and Mercado (2018) examined financial inclusion in Asia, emphasizing its role in reducing poverty and inequality. The study highlighted that while access to financial services positively impacts economic well-being, disparities in accessibility persist, especially for women and rural populations. Similarly, Ozili (2020) explored the global drivers of financial inclusion and identified that digital financial services, such as mobile banking, have significantly expanded access in developing countries. However, the study also pointed out that the digital divide continues to exclude vulnerable groups, limiting the broader impact of financial inclusion.

Klapper and Lusardi (2020) emphasized the role of technology-driven financial services in enhancing economic well-being globally, particularly during crises such as the COVID-19 pandemic. Their research found that digital financial inclusion mitigated economic shocks by ensuring access to savings and credit, even during lockdowns. This aligns with the findings of Gupta et al. (2022), who highlighted the role of fintech in expanding access to financial services among unbanked populations in South Asia. These studies collectively emphasize that while financial inclusion initiatives have advanced significantly, systemic barriers such as gender inequality, lack of infrastructure, and digital literacy gaps continue to hinder their full potential.

Research by Chattopadhyay (2011) and Yadav and Sharma (2016) highlights that women, particularly in rural areas, face disproportionate barriers to banking access, including social norms and mobility constraints. Bhatia and Singh (2019) similarly observed that women in rural regions are often excluded from formal financial systems, limiting their ability to achieve economic well-being. Studies like those by Sarma (2008) and Ibekwe et al. (2021) reveals that people with higher income and literacy levels have better financial access. This highlights the need for focused and targeted interventions for the low-income and low-literacy populations.

Despite these findings, gaps remain in understanding the comparative impact of financial inclusion within the same socio-economic setting. First, most research has focused on either rural or urban populations, leaving out the nuanced differences within mixed or single settings. Second, numerous studies have established a positive correlation between financial inclusion and enhanced economic well-being (Sarma, 2008; Allen et al., 2012; Demirguc-Kunt & Klapper, 2013). These findings underscore the importance of access to formal financial systems in reducing economic vulnerabilities and promoting financial resilience. However, existing research has largely focused on aggregate financial inclusion outcomes, leaving gaps in understanding how banking access impacts economic well-being at an individual level, particularly across diverse demographic groups in India. The influence of factors such as age, gender, education, and income on economic well-being in the context of financial access remains underexplored. Third, studies such as those by Demirguc-Kunt et al. (2018) and Allen et al. (2022) call for more granular analyses of how financial inclusion varies across demographic groups within similar environments.

Our study aims to fill in the above research gaps by comparing individuals with and without bank accounts in Bengaluru Urban District (Karnataka State, India). Furthermore, it examines

how demographic factors, such as age, gender, and income, influence economic well-being within these groups, thereby contributing to a more comprehensive understanding of financial inclusion's role in enhancing economic stability.

The basic hypothesis tested in this paper is whether banking access influences economic well-being. Banking access refers to an individual's ability to use formal financial services such as opening a bank account, depositing and withdrawing money, and engaging in digital or in-person transactions through regulated financial institutions. It is a key indicator of financial inclusion (Demirgüç-Kunt et al., 2018; World Bank, 2018). Economic well-being is the extent to which individuals can meet their current financial obligations, feel secure in their financial future, and make choices that allow enjoyment of life. It encompasses financial security, resilience, control over finances, and satisfaction with economic circumstances (CFPB, 2015).

2. Research methodology

2.1. Study area

This study was conducted in Bengaluru Urban District, Karnataka. Karnataka was selected as it ranks sixth in the country for financial inclusion, according to the CRISIL Inclusix Report (2018). Within the state, Bengaluru Urban District was chosen for its strong banking infrastructure, growing digital finance usage, and large urban population (Puttalingaiah et al., 2020; Vani & Latha, 2024). The district includes both well-connected areas and underserved communities, making it suitable for examining access to financial services (Roy et al., 2018). It also has a high number of migrant workers and informal sector participants, many of whom remain unbanked (Nagesha & Halaswamy, 2023; Shamala & Prasad, 2019). This mix of inclusion and exclusion provides a useful setting to study the link between banking access and economic well-being.

2.2. Sample size

To determine the appropriate sample size for this study, Cochran's (1977) formula for sample size estimation was applied, assuming an unknown or large population. This formula is particularly useful when there is no precise knowledge of the total number of individuals in the population. The calculation was based on a 95% confidence level ($Z = 1.96$), a maximum variability estimate ($p = 0.5$), and a 5% margin of error ($e = 0.05$). The calculated minimum required sample size was therefore approximately 385 respondents. In this study, a total of 390 respondents were selected—comprising 195 bank users and 195 non-users—to meet and slightly exceed the minimum requirement. This also ensured equal representation for comparative analysis and accounted for any potential non-responses or missing data.

2.3. Sampling method

This study employed a simple random sampling technique to ensure that all eligible individuals within the target population (both bank users and non-users) had an equal chance of being selected. The sample was drawn from multiple localities within Bengaluru Urban District, ensuring that variation in socio-economic status, occupation, and residential backgrounds was adequately captured. The selection was conducted independently for bank users and non-users, with 195 individuals in each category, resulting in a total sample size of 390.

As the study focuses on comparative analysis, the samples are categorized into two clusters of respondents who are categorized based on their usage of banking services. The total sample of 390 individuals from Bengaluru Urban District was divided equally into two clusters: one consisting of bank account users, and the other of non-users. These clusters were formed for the purpose of comparative analysis of financial inclusion and economic well-being. Data for this study was

collected using a structured questionnaire (a copy of the questionnaire is available from authors upon request) during the period October 2024 to January 2025 in Bengaluru Urban District. The questionnaire was administered by the author through Google Form that was in bilingual mode - Kannada and English - to ensure accessibility. Since most respondents had access to mobile phones and the internet, the online format was effective in reaching a diverse sample and collecting reliable responses.

2.4. Statistical design

Data analysis was done by applying descriptive statistics (mean, standard deviation) and inferential statistics (t-tests, ANOVA) to compare the EWB scores of bank users and non-users. The effect size was also calculated using Cohen's d test to assess the practical significance of the results. Additionally, the standard Binary Logistic Regression Model was used to estimate the probability of an individual's economic well-being by his/her access to banking services.

3. Analysis, results and discussions

3.1. Description of primary data

The demographic profile of the sample includes variables such as gender, age, education, marital status, employment sector, monthly income range and access to banking are described in Table 1.

Table 1: Demographic profile of the respondents

Demographic characteristics	Frequency	Percent
Gender		
Male	268	68.72
Female	122	31.28
Age		
Less than 25	36	9.23
26–35	63	16.15
36–45	175	44.87
46–55	73	18.72
Above 55	43	11.03
Education		
No formal education	104	26.67
School education (Std 1-Std 10)	133	34.10
Intermediate education (PUC)	70	17.95
Graduation (UG)	57	14.62
Post-graduation	26	6.67
Marital status		
Married	307	78.72
Unmarried	44	11.28
Divorced/ Separated	39	10.00
Employment Sector		
Government employee	26	6.67
Private sector employee	150	38.46
Retired	25	6.41
Self-employed/Business	96	24.62

Demographic characteristics	Frequency	Percent
Unemployed	93	23.85
Monthly Income Range		
Below 5,000	86	22.05
5,001–10,000	96	24.62
10,001–15,000	164	42.05
15,001–20,000	30	7.69
Above 20,000	14	3.59
Have bank account		
Yes	195	50.00
No	195	50.00

Source: Calculated by authors using own survey data.

The study describes the demographic profile of the respondents as presented in Table 1. In terms of gender, males make up the majority (68.72%) of respondents, while females account for 31.28%. The age distribution indicates that the highest proportion of respondents falls in the 36-45 age group (44.87%), followed by those in the 26-35 age group (16.15%). Regarding education, a significant percentage of respondents (34.10%) have school-level education (Standard 1-10), while 26.67% have no formal education. The marital status shows that a large portion of respondents are married (78.72%), with smaller groups being unmarried (11.28%) or divorced/separated (10%). In terms of employment, a majority work in the private sector (38.46%), followed by those who are self-employed or run a business (24.62%), with fewer respondents in government jobs (6.67%) or retired (6.41%). Regarding monthly income, the most common income range is 10,001–15,000 INR (42.05%), followed by 5,001–10,000 INR (24.62%), and 22.05% of respondents earn below 5,000 INR. A smaller proportion earns above 20,000 INR (3.59%).

The demographic data collected in this study is highly relevant for analyzing the influence of banking access on economic well-being, particularly given that 50% of the respondents are unbanked. The male dominance in the sample (68.72%) reflects the broader gender distribution in India's workforce, especially in sectors with a higher male participation. The significant proportion of respondents with lower education levels (60.77% having school-level or no formal education) highlights a vulnerable group that may face barriers to financial literacy and inclusion. A notable pattern emerges when examining education levels, employment sectors, and income ranges. Many respondents with limited educational qualifications are concentrated in lower-paying jobs, primarily in the private sector (38.46%) or as self-employed (24.62%). This lack of formal education often restricts access to higher-paying, secure jobs, resulting in a significant portion of respondents earning low to moderate monthly incomes, such as Rs.10,001–Rs.15,000 (42.05%) or even below Rs. 5,000 (22.05%). These factors collectively indicate why half of the respondents remain unbanked. Limited education may lead to a lack of awareness or trust in formal banking systems, while irregular or low incomes, common in private-sector or self-employed roles, might deter individuals from accessing or maintaining banking services. This comprehensive demographic representation sheds light on the challenges faced by unbanked populations and highlights the critical role that improved banking access can play in enhancing their economic well-being.

This equal representation of banking users and non-users across varied demographic groups provides a robust foundation for analyzing the

impact of banking access on economic well-being (EWB). The diverse range of ages, educational backgrounds, income levels, and employment types ensures that the study reflects a broad spectrum of financial experiences, offering valuable insights into the role of banking access in shaping economic well-being.

The descriptive statistics by bank users and non-users are presented in Table 2. The EWB score was calculated by averaging responses to a group of Likert-scale items that measured different aspects of economic well-being. Each item used a 5-point scale, and the overall score for each respondent was derived by computing the arithmetic mean of these item responses. The trimmed mean, as reported in the descriptive statistics, was obtained by excluding the lowest and highest 5% of individual scores before calculating the average. This method reduces the impact of outliers and provides a more stable estimate of the central tendency within each group.

Table 2: Descriptive statistics by bank users and non-users

		Bank Users		Non-Users	
		Statistic	**Std. Error**	**Statistic**	**Std. Error**
Mean		4.1165	0.06063	2.33	0.06115
95% Confidence Interval for Mean	Lower Bound	3.9969		2.2094	
	Upper Bound	4.2361		2.4506	
5% Trimmed Mean		4.1725		2.3228	
Median		4.7143		2.5714	
Std. Deviation		0.84664		0.85398	
Minimum		1.86		1	
Maximum		4.93		3.93	
Range		3.07		2.93	

Source: Same as in Table 1.

The average EWB score for bank account users is 4.12, indicating a strong agreement (close to "agree") on economic well-being. We can be 95% confident that the true mean EWB score for this group lies between 3.997 and 4.236. The midpoint value of EWB scores is 4.71, slightly higher than the mean, showing a skew towards higher scores. Scores vary by approximately a standard deviation of 0.85 units around the mean, indicating a moderate variability. The EWB scores for this group range from 1.86 to 4.93, covering a wide spread.

The average EWB score for non-bank account users is 2.33, indicating a position closer to "disagree". We can be 95% confident that the true mean EWB score for this group lies between 2.209 and 2.451. The midpoint EWB score is 2.57, slightly higher than the mean, suggesting a small skew towards higher scores. Scores vary by approximately a standard deviation of 0.85 units, showing moderate variability similar to Group 1. The EWB scores for this group range from 1.00 to 3.93, covering a narrower spread than Group 1.

3.2. Statistical analysis of data

Table 2 showed that Group 1 (bank account users) has a higher mean EWB score (4.12) compared to Group 2 (non-users, 2.33). This substantial difference highlights that having a bank account positively correlates with a higher economic well-being. The wide gap in mean scores and the higher median for bank users suggest

practical relevance. Access to banking facilities may contribute to a stronger sense of economic well-being. Table 3 provides descriptive statistics for the two groups: individuals with a bank account (Group 1) and without a bank account (Group 2).

Table 3: EWB mean scores by bank users and non-users

EWB Mean	N	Mean	Std. Deviation	Std. Error Mean
Bank Users	195	4.1165	.84664	.06063
Bank Non-Users	195	2.3300	.85398	.06115

Source: Authors.

The mean EWB score for individuals with bank accounts is 4.12 (close to "Agree"). For those without bank accounts, the mean score is 2.33 (between "Disagree" and "Neutral"). The standard deviations (~0.85) are similar across the two groups, indicating consistent variability in responses. This suggests that individuals with access to banking services are more likely to agree or strongly agree with statements reflecting higher economic well-being, while those without access lean towards disagree or remain neutral. This result indicates that the economic well-being of individuals with bank accounts is significantly higher compared to non-users. In other words, the influence of banking access on the economic well-being of the respondents is substantially high.

Levene's Test as shown in Table 4 confirms that the assumption of equal variances holds true ($p = 0.651 > 0.05$). For the t-test for Equality of Means, $t = 20.745$, $p < 0.001$ reveals a statistically significant difference in EWB scores between bank users and non-users. The Mean difference of 1.786 indicates that bank users have significantly higher EWB scores. At 95% confidence interval (CI), the true mean difference lies between 1.617 and 1.956, confirming the practical significance of the results and that the observed difference is both statistically reliable and practically meaningful.

Access to banking services positively and significantly impacts individuals' perception of economic well-being. This highlights the critical role of financial inclusion in improving economic outcomes, reinforcing the need for targeted policies to expand banking access among underserved populations.

Table 4: Independent samples test

Test	t	df	p-value	Mean Difference	Std. Error	95% CI (Lower)	95% CI (Upper)
Equal variances assumed	20.745	388	< 0.001	1.786	0.086	1.617	1.956
Equal variances not assumed	20.745	387.971	< 0.001	1.786	0.086	1.617	1.956

Source: Authors.

Note: Levene's Test for Equality of Variances yielded $F = 0.204$, $p = 0.651$, indicating that equal variances can be assumed.

Cohen's d: 2.101 as per Table 5, indicates a very large effect size (greater than 0.8). Hedges' Correction and Glass's Delta confirm this large effect. The effect size of 2.10 indicates that the difference in EWB scores between bank users and non-users is not only statistically significant but also practically meaningful. Access to banking has a substantial positive impact on individuals' perceived economic well-being.

Table 5: Independent samples effect sizes

Standardizer	Point Estimate	95% CI (Lower)	95% CI (Upper)
Cohen's d	2.101	1.853	2.347
Hedges' correction	2.097	1.849	2.343
Glass's delta	2.092	1.803	2.378

Source: Authors.

Note: The standardizer used for Cohen's d and Hedges' correction is the pooled standard deviation. Hedges' correction includes a small sample bias correction. Glass's delta uses the standard deviation of the control group.

Overall, Levene's Test for Equality of Variances yielded a significance value of 0.651, which is greater than 0.05, confirming that the assumption of equal variances holds true for the two groups. The t-test for Equality of Means shows a t-value of 20.745 with a p-value less than 0.001, leading to the rejection of the null hypothesis. This indicates a statistically significant difference in economic Well-being scores between individuals with and without bank accounts. The mean difference of 1.79, with a 95% Confidence Interval ranging from 1.62 to 1.96, further reinforces the reliability of the results. Additionally, the effect size (Cohen's d) of 2.101 demonstrates a very large effect, highlighting not only the statistical significance but also the practical significance of the difference observed. These findings emphasize the substantial impact of having access to banking services on individuals' economic well-being.

3.3. Determinants of economic well-being with reference to access to banking services

To test whether access to banking services significantly predicts an individual's economic well-being, a binary logistic regression is estimated. The dependent variable is economic well-being with binary values of 1 = High well-being and 0 = Low well-being. The independent variable is access to a bank account with values of 1 = Has access and 0 = No access. The estimation results, goodness of fit and accuracy of predictions of the model are given below in Table 6 through Table 8.

Table 6: Bank access as a determinant of economic well-being in bengaluru: Estimates of binary logit model

Variable	Coefficient (B)	Std. Error	Wald x^2	p-value	Exp(B)*
Bank Access (Yes = 1)	4.079	0.347	138.373	0	59.094
Constant	-1.355	0.177	58.337	0	0.258

Source: Authors.

Note: Exp(B) values > 1 indicate increased odds of higher economic well-being.

Table 7: Model fit statistics

Fit Statistic	Value
Omnibus Chi-Square (df = 1)	244.528
Significance (p-value)	0
-2 Log Likelihood	288.058
Cox & Snell R^2	0.466
Nagelkerke R^2	0.625
Hosmer–Lemeshow Test	Not computed ($\chi^2 = 0$, df = 0) – model may show quasi-perfect prediction
Overall Classification Accuracy	86.70%

Source: Authors.

Table 8: Accuracy of the logit model by obsersved and predicted values

Observed Group	Correctly Predicted	Accuracy (%)
Economic Well-Being = Low	155 out of 167	92.80%
Economic Well-Being = High	183 out of 223	82.10%
Overall Accuracy	338 out of 390	86.70%
Baseline Model Accuracy	–	57.20%

Source: Authors.

The results as per Table 8, show that the model correctly predicted 92.8% of cases where economic well-being is low and 82.1% where it is high. The overall classification accuracy is 86.7%, which is a significant improvement from the baseline model (57.2%), indicating good predictive power.

Binary logistic regression model is statistically significant as per the results in Table 7, $\chi^2(1) = 244.53$, $p < .001$, and explained approximately 62.5% of the variance in economic well-being (Nagelkerke $R^2 = .625$). Table 6 presents the estimates of Binary Logit Model which reveals that the access to banking services significantly predicted economic well-being ($B = 4.079$, $p < .001$). The odds of reporting high economic well-being were 59 times greater for individuals who had access to banking services compared to those who did not (Exp(B) = 59.094). The Hosmer–Lemeshow test could not be computed, which may suggest near-perfect classification or quasi-complete separation. Nonetheless, other model fit indicators and classification performance support the model's effectiveness.

Since the predictor variable (bank access) is found to be statistically significant, it is concluded that access to banking services significantly predicts an individual's economic well-being.

4. Summary and conclusion

Our results demonstrate a statistically and practically significant difference in economic well-being (EWB) scores between individuals with and without access to banking services. Individuals with a bank account report a mean EWB score of 4.12, reflecting agreement with statements of higher economic well-being. In contrast, individuals without a bank account have a significantly lower mean score of 2.33, which aligns closer to "Disagree" and "Neutral". The

effect size (Cohen's d = 2.101) is exceptionally large, indicating that the observed difference is not only statistically reliable but also practically meaningful. Additionally, the binary logistic regression also further strengthened the results as it revealed that access to banking services significantly predicted economic well-being.

This finding is consistent with previous research that highlights the role of financial inclusion in improving economic outcomes. For instance, the National Bureau of Economic Research (NBER) found that greater financial inclusion is associated with higher probabilities of wealth creation and breaking the poverty cycle, particularly among individuals with higher education and stable social conditions (NBER, 2024). Similarly, another study on the role of banking access emphasizes that financial inclusion supports economic growth by improving credit accessibility and encouraging savings, which directly enhances economic well-being (Jungo, 2024). Moreover, a study that examined the effect of financial inclusion on economic growth found a strong positive correlation between financial inclusion and economic growth, showing that access to banking services plays a critical role in improving individuals' economic status (Boachie & Adu-Darko, 2024).

These findings underline the importance of expanding banking access to underserved populations, as it not only enhances financial stability but also significantly improves perceptions of economic well-being.

The above findings suggest that expanding banking access, particularly in underserved populations, is essential for promoting economic well-being. Policy interventions aimed at improving financial inclusion, especially for marginalized groups, may have a significant impact on enhancing overall economic outcomes. Future studies may consider longitudinal designs to explore the long-term effects of banking access on economic well-being. Additionally, expanding the research to include rural areas and examining the role of digital financial services could provide a more comprehensive understanding of financial inclusion's impact.

References

Allen, F., Demirguc-Kunt, A., Klapper, L., & Martinez Peria, M. S. (2012). The foundations of financial inclusion: Understanding ownership and use of formal accounts. World Bank Policy Research Working Paper, (6290). https://doi.org/10.1596/1813-9450-6290

Allen, F., Demirguc-Kunt, A., Klapper, L., & Martinez Peria, M. S. (2022). Financial inclusion and development: Recent progress and remaining challenges. The World Bank Economic Review, 36(Supplement 1), S3-S22. https://doi.org/10.1093/wber/lhac015

Bhatia, A., & Singh, B. (2019). Gender disparity in financial inclusion: The Indian case. International Journal of Social Economics, 46(6), 789–803. https://doi.org/10.1108/IJSE-11-2018-0605

Boachie, C., & Adu-Darko, E. (2024). The effect of financial inclusion on economic growth: The role of human capital development. Cogent Social Sciences, 10(1). https://doi.org/10.1080/23311886.2024.2346118

Bongomin, G. O. C., Ntayi, J. M., Munene, J. C., & Malinga, C. A. (2016). Financial inclusion and financial well-being: When financial literacy and social capital matter. International Journal of Social Economics, 43(8), 856–877. https://doi.org/10.1108/IJSE-03-2015-0072

Chattopadhyay, S. K. (2011). Financial inclusion in India: A case-study of West Bengal. Reserve Bank of India Working Paper Series, (10/2).

Cochran, W. G. (1977). Sampling techniques (3rd ed.). John Wiley & Sons.

Consumer Financial Protection Bureau (CFPB). (2015). Financial well-being: The goal of financial education. https://files.consumerfinance.gov/f/201501_cfpb_report_financial-well-being.pdf

Council on Social Work Education (CSWE). (2016). Working Definition of Economic Well-Being. Council on Social Work Education (CSWE). https://www.cswe.org/centers-initiatives/economic-wellbeing-clearinghouse/working-definition-of-economic-wellbeing/

CRISIL Inclusix Report. (2018). CRISIL. https://www.crisil.com/en/home/our-analysis/publications/crisil-inclusix.html

Demirguc-Kunt, A., & Klapper, L. (2013). Financial inclusion and inclusive growth: A review of recent empirical evidence. World Bank Policy Research Working Paper, (8021).

Demirguc-Kunt, A., Klapper, L., Singer, D., Ansar, S., & Hess, J. (2018). The Global Findex Database 2017: Measuring financial inclusion and the fintech revolution. The World Bank. https://doi.org/10.1596/978-1-4648-1259-0

Diener, E. (1984). Subjective well-being. Psychological Bulletin, 95(3), 542–575. https://doi.org/10.1037/0033-2909.95.3.542

Ghosh, S. (2012). Determinants of banking outreach: An empirical assessment of Indian states. Journal of Economic Studies, 39(4), 450–468. https://doi.org/10.1108/01443581211259302

Gupta, R., Narayanan, A., & Verma, S. (2022). The role of fintech in financial inclusion: Evidence from South Asia. Asian Economic Review, 64(2), 123–140.

Ibekwe, U., Adegbite, O., & Nweze, E. (2021). Education and income as predictors of financial inclusion in Sub-Saharan Africa. African Journal of Economic Policy, 28(3), 79–102.

Jungo, J. (2024). Institutions and economic growth: The role of financial inclusion, public spending on education and the military. Review of Economics and Political Science, 9(3), 298–315. https://doi.org/10.1108/REPS-04-2023-0034

Klapper, L., & Lusardi, A. (2020). Financial literacy and resilience to economic shocks. In A. Lusardi (Ed.), The Economics of Financial Education (pp. 105–122). Palgrave Macmillan.

Nagesha, B. & Halaswamy M. V. (2023). An Economic Analysis of Street Vendor Migrants in Bengaluru City. International Journal of Management and Development Studies, 12(9), Article 9. https://doi.org/10.53983/ijmds.v12n09.001

Nandru, P., Chendragiri, M., & Velayutham, A. (2021). Examining the influence of financial inclusion on financial well-being of marginalized street vendors: An empirical evidence from India. International Journal of Social Economics, 48(8), 1139–1158. https://doi.org/10.1108/IJSE-10-2020-0711

NBER. (2024). Financial Inclusion and Wellbeing. NBER. https://www.nber.org/brd/20243/financial-inclusion-and-wellbeing

Osberg, L., & Sharpe, A. (2002). An Index of Economic Well–Being for Selected OECD Countries. Review of Income and Wealth, 48(3), 291–316. https://doi.org/10.1111/1475-4991.00056

Ozili, P. K. (2020). Financial inclusion research around the world: A review. Forum for Social Economics, 49(4), 457–475. https://doi.org/10.1080/07360932.2020.1715238

Park, C.-Y., & Mercado, R. V. (2018). Financial inclusion, poverty, and income inequality in developing Asia. Asian Development Bank Economics Working Paper Series, (539). https://doi.org/10.2139/ssrn.3177686

Puttalingaiah, S., Hanjagi, A. D., & Irfan, S. (2020). Levels of Urbanization in Bangalore Urban District of Karnataka, India. European Proceedings of Social and Behavioural Sciences, Innovation and Transformation in Humanities for a Sustainable Tomorrow. https://doi.org/10.15405/epsbs.2020.10.02.7

Roy, D., Lees, M. H., Pfeffer, K., & Sloot, P. M. A. (2018). Spatial segregation, inequality, and opportunity bias in the slums of Bengaluru. Cities, 74, 269–276. https://doi.org/10.1016/j.cities.2017.12.014

Sarma, M. (2008). Index of financial inclusion. Indian Council for Research on International Economic Relations Working Paper, (215).

Shamala, B., & Prasad, T. R. (2019). The Socio Economic Status of Unorganised Migrant Construction Labourers in Karnataka: A Case Study in Bangalore. Shanlax International Journal of Economics, 7(2), Article 2. https://doi.org/10.34293/economics.v7i2.319

Vani, K., & Latha, R. (2024). Digital financial services and financial inclusion: A study of banking transformation in urban Bengaluru. ShodhKosh: Journal of Visual and Performing Arts, 5(2), Article 2. https://doi.org/10.29121/shodhkosh.v5.i2.2024.5276

World Bank. (2018). Global Findex database: Measuring financial inclusion and the fintech revolution. https://globalfindex.worldbank.org/

Yadav, R., & Sharma, M. (2016). Financial inclusion: Role of demographic factors in adoption of mobile banking services in India. International Journal of Financial Services Management, 9(3), 232–248.

Women empowerment through skill development: A case study of food processing industry in Karnataka

S. Sriranjani Mokshagundam [1] and Krishna Raj [2]

Abstract

Women's participation in the food processing industry remains constrained due to skill gaps, workplace biases and socio-cultural barriers. This study assesses skill development opportunities for women in the sector and their impact on women empowerment through well-designed skill development training programs. Using the newly collected primary data from 416 respondents across various management levels in Bengaluru's food processing firms, skill development training and women's empowerment are analysed, particularly in the areas of job security, decision-making ability, and confidence. Digital literacy remains a major gap, while financial constraints limit access to training. Government initiatives and private sector programs have played a crucial role in this respect, but further interventions are needed to ensure inclusivity. The study recommends expanding digital training, improving financial accessibility, creating awareness regarding SDPs and strengthening mentorship towards enhancing women's workforce participation, bridging the skill gap and ensuring economic empowerment of women in the food processing industry.

JEL Classification Codes: *J16, J24, L66, M53, O15, Q13*

1. Introduction

Women constitute a significant proportion of the workforce, and their empowerment through skill development assumes significance in the process of development. Historically, the position of women in Indian society has undergone several transformations, from equal opportunities in ancient times to a period of extreme socio-economic subjugation during the medieval era. Although the post-independence era witnessed constitutional safeguards aimed at promoting gender equality, disparities in employment and skills acquisition continue to persist. However, given the potential of women as catalysts of economic transformation, the need for well-planned skill enhancement initiatives has gained prominence in the recent years, particularly in high-growth sectors like food processing.

While India's economic growth trajectory underscores the importance of women's participation in the workforce, a significant proportion of women continues to remain engaged in informal, low-paying jobs, with a limited access to formal skill training. According to the National Accounts Statistics 2024, the food processing sector has shown a steady growth, with its Gross Value Added (GVA) rising from ₹1.61 lakh crore in 2015–16 to ₹1.92 lakh crore in 2022–23, reflecting an Average Annual Growth Rate (AAGR) of about 5.35% over eight years.

Employment in the sector has also increased steadily, as reflected in the Annual Survey of Industries, from 17.73 lakh workers in 2014–15 to approximately 20.68 lakh in 2021–22. As a vital contributor to India's GDP growth and job creation, the food processing industry offers a considerable scope for enhancing women's

[1] *Post Doctoral Research Fellow, Institute for Social & Economic Change, Dr. VKRV Rao Road, Nagarabhavi, Bengaluru – 560072, India. E-mail: mokshagundam89@gmail.com*

[2] *Professor & Dean, Center for Economic Studies & Policy, Institute for Social & Economic Change, Dr. VKRV Rao Road, Nagarabhavi, Bengaluru – 560072, India. E-mail: krishnarajisec@yahoo.co.uk*

workforce participation through focused skill development initiatives at different levels.

Studies have consistently emphasized the role of financial inclusion, digital literacy, and vocational training in facilitating women's economic empowerment. Research by Kumari (2023) and Ambastha (2023) shows the significance of financial inclusion in enabling women's participation in formal economic activities. Dalal et al. (2022) highlight the protective role of digital empowerment against the workplace exploitation, while Biswas and Banu (2022) analyze the labor force participation disparities characterising urban and rural women.

Skill development initiatives, particularly related to the food processing sector, have been linked to improved employment prospects and entrepreneurial ventures. Studies by Sedai et al. (2022) demonstrate the positive impact of electricity access on women's economic agency, whereas Sihag and Vermani (2022) assess the collective role of Self-Help Groups (SHGs) in fostering entrepreneurship. The findings indicate that targeted skill training programs can enhance women's employability and financial security.

The food processing industry offers exclusive opportunities to women's workforce integration. Studies by Heena (2022) and Babu (2022) examine historical barriers to women's participation in this sector, such as socio-cultural norm and a limited access to training facilities. A study by Prabhakar and Nimesh (2022) evaluates government-led skill development programs, emphasizing the need for gender-sensitive training methodologies.

Entrepreneurial ventures in food processing have gained prominence, with research highlighting the impact of initiatives like the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the National Skill Development Corporation (NSDC), while Kumari (2023) and Sayeed (2023) view such initiatives as contributory to women's financial autonomy and market competitiveness. However, persistent challenges, such as inadequate funding, lack of mentorship and digital illiteracy, limit the scalability of these programs.

Despite the recognized importance of skill development regarding women's economic empowerment, there is limited research on sector-specific training opportunities in the food processing industry. Existing studies primarily focus on general workforce participation rather than industry-specific challenges, such as access to relevant training and career progression. While financial inclusion is acknowledged as a key enabler of women's participation, research on integrating financial literacy into skill training programs tailored to food processing remains scarce. Additionally, the impact of industry-specific training on long-term career growth has not been thoroughly explored.

While Government-led initiatives aim at promoting/encouraging women's entrepreneurial ventures/activities, their effectiveness in equipping women with sustainable skills for employment or business success in food processing remains unclear. Challenges such as digital illiteracy, inadequate mentorship and lack of gender-sensitive training continue to hinder women's full participation. There is also a need for assessing whether existing skill development programs align with industry demands and how they influence women's career trajectories. Current research highlights the benefits of vocational training but does not provide sufficient insights into the transition from training into stable employment. Addressing these gaps can help tailor skill development initiatives to enhance women's workforce participation and entrepreneurial success in the food processing sector.

With this background, the key objectives of this study are to (a) identify the food processing companies, which provide skill development programs specifically designed for women in Bengaluru; (b) analyse the impact of skill development programs on women's empowerment

in food processing companies in Bengaluru; and (c) recommend measures for the skill development of women in food processing companies.

The rest of this paper is organised as follows: Section 2 provides a brief background to the concept of skill development in the context of women empowerment and government policy initiatives. Section 3 outlines the methodology of the study. Results and discussion are given in section 4. Section 5 concludes the paper.

2. Background information

2.1. Concept of women empowerment through skill development

Empowerment is a process of enabling individuals to make informed choices, exercise control over resources and participate actively in the decision-making process. Women's empowerment, as defined by international organizations such as UNDP, the World Bank, OECD and UN Women, encompasses social, political and economic dimensions, with economic empowerment being particularly crucial. It enhances women's agency, mobility, access to financial resources and employment opportunities. Skill development is widely recognized as a key driver of economic empowerment in terms of equipping women with technical, managerial and entrepreneurial skills, that promote self-reliance and inclusive growth. These organizations emphasize that targeted, market-relevant training is essential for increasing women's participation in the labour force, addressing gender gaps and enabling sustainable livelihoods, especially among marginalized communities.

In the context of food processing sector, skill development encompasses an extensive range of competencies, including food safety standards, packaging, quality control, entrepreneurship and supply chain management. Government initiatives, such as the National Skill Development Corporation (NSDC) and the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) are focusing on bridging the skill gap for women in this sector. However, challenges such as socio-cultural constraints, digital illiteracy, and inadequate infrastructure persist.

2.2. Skill development opportunities for women in food processing industry

The food processing industry is a significant driver of India's economic growth and employment generation, offering substantial opportunities to enhancing women's workforce participation. Despite playing a major role in agriculture and allied sectors, women remain underrepresented in formal roles within food processing. According to the Periodic Labour Force Survey (PLFS) 2023–24, the female labour force participation rate stands at 37.0% for rural areas and 25.4% for urban areas, reflecting the persistent disparities in access to formal employment opportunities, particularly in industrial sectors such as food processing (Ministry of Statistics and Programme Implementation).

Skill development programs have emerged as crucial tools of bridging this gap. Initiatives like the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the SAMPADA scheme under the Ministry of Food Processing Industries (MoFPI) are focused on training women in food processing techniques, quality control, packaging and entrepreneurship. These programs not only equip women with market-relevant skills but also foster self-confidence, decision-making abilities, and financial independence. Thus, skill development plays a transformative role in enabling women to transition from informal roles to formal employment and leadership positions within the food processing industry.

2.3. Government initiatives and policy support

The Government of India has introduced various initiatives towards enhancing women's involvement in the food processing sector.

Programs such as the Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and the National Skill Development Corporation (NSDC) are oriented to industry-specific training, covering areas like food safety, quality control and packaging. Additionally, the Pradhan Mantri Formalization of Micro Food Processing Enterprises (PM-FME) scheme supports women entrepreneurs through financial aid and training.

At the state level, Karnataka's Skill Development Initiative (KSDI) and the Karnataka State Women Development Corporation (KSWDC) work towards expanding training programs tailored to women in food processing. Bengaluru, being a hub of food technology and innovation, has seen the growth of specialized training centers focused on digital literacy, supply chain management and entrepreneurship for women.

2.4. Effect of skill development on women empowerment in the food processing industry

Skill development plays a defining role in empowering women in the food processing sector. Training programs not only improve employability, but also strengthen women's agency in decision-making, financial independence and career progression.

a) Enhanced Confidence and Decision-Making Ability – Women trained in food processing show increased self-confidence and decision-making skills. Studies by Mehrotra and Parida (2019) and reports from UN Women (2017) and FICCI (2020) find that structured skill training enhances women's leadership abilities and their capacity to negotiate better work conditions thereby supporting both economic and social empowerment.

b) Economic Independence and Financial Empowerment – Skill training programs enable women to get into better-paying jobs or start their own ventures that help reduce financial dependency and improve their economic stability. Entrepreneurial training further equips them with the knowledge for accessing credit and expanding their businesses.

c) Workplace Inclusivity and Career Progression – Companies implementing skill development initiatives witness improved female workforce participation. Women equipped with industry relevant skills are more likely to move beyond entry-level roles into managerial or supervisory positions.

d) Breaking Gender Stereotypes – Skill development challenges traditional gender roles through enabling women to break into male-dominated areas within the food processing industry. As more women receive training and gain employment, societal perceptions of women's capabilities related to technical and leadership roles shift positively.

e) Improved Work-Life Balance and Social Empowerment – Training programs, that incorporate flexible learning options, help women manage professional and personal responsibilities more effectively. Additionally, mentorship and networking opportunities provided through these programs enhance their social capital and long-term empowerment.

Thus, skill development serves as an influential instrument of women's empowerment in the food processing industry. Through providing women with the necessary technical and managerial skills, these initiatives enhance their confidence, economic independence and career prospects. While noteworthy progress has been made through government and private-sector interventions, continuous and concentrated efforts are required to overcome the persisting barriers towards a more comprehensive and conducive work environment. Further strengthening the skill development programs can not only empower women, but also impact the overall growth and competitiveness of the food processing sector.

3. Methodology

3.1. Data

3.1.1. Primary data

This study employed a mixed-method approach to investigate the influential role of skill development in empowering women in Bengaluru's food processing industry. Both qualitative and quantitative data collection methods were employed for ensuring depth, breadth, and contextual relevance.

Phase 1: Qualitative survey based on interview method

A pilot study was first conducted involving 20 women employees across different food processing companies. This pilot study helped refine the tools and methods used in the study. Subsequently, Focus Group Discussions (FGDs) were organized as part of exploring shared experiences, skill needs and empowerment challenges. These sessions generated rich qualitative data that informed the final survey instrument. Details of this pilot survey are as follows.

- Respondents: Women employees and professionals from various departments and managerial levels.
- Sample size and selection: 20 participants for the pilot study, selected purposively; additional participants for FGDs selected based on availability and relevance to the study.
- Period of survey: March to May 2023.

Phase 2: Quantitative survey using questionnaire method

Through a quantitative survey, the primary data was collected from the women employees across 104 food processing companies in Bengaluru, employing a structured questionnaire method. The survey captured the relevant data related to perceptions, workplace experiences and the impact of skill development programs on women's empowerment.

- Respondents: Employees from three organizational levels — top, middle, and low.
- Sample Size:
  - Top-level: 104 respondents (1 per company)
  - Middle-level: 208 respondents (2 per company)
  - Low-level: 104 respondents (1 per company)
  - Total: 416 respondents
- Sampling Method: Stratified Random Sampling, ensuring representation across company size and hierarchical roles.
- Period of Survey: June to September 2023.

3.1.2. Secondary data

Secondary data for this study were collected from different sources, including government reports such as those published by the Ministry of Women and Child Development, Ministry of Food Processing Industries, Food Processing Vision 2025, the Periodic Labour Force Survey (PLFS) and the Karnataka Skill Development Authority (KSDA). Additionally, industry databases and reports from organizations such as the Federation of Karnataka Chambers of Commerce & Industry (FKCCI), Federation of Indian Chambers of Commerce and Industry (FICCI) and the National Skill Development Corporation (NSDC) were also utilized for supporting the research findings.

3.2. Techniques of analysis

Descriptive statistics, Structural Equation Model, and Regression techniques are used for assessing the empowerment factors in the food processing industry.

4. Results and discussion

4.1. Description of data

Table 1 shows whether respondents have received any formal training related to the food processing industry. It indicates that most of the respondent (80.8%) have undergone formal training related to processing and 19.2% of respondents have had no formal training.

Table 1: Extent of formal training received by survey respondents related to food processing

Response	Frequency	Percent
Yes	336	80.8
No	80	19.2
Total	**416**	**100.0**

Source: Authors' survey.

Table 2 details the types of training obtained by respondents, providing significant insights into their professional development in the food processing business. It reveals a wide range of training types/categories pointing to the multidimensional character of skill development in this discipline. Notably, technical skills related to food processing and manufacturing appear as the most popular training area, with 40.4% of the respondents taking advantage of such programs offered by food processing companies. About 41.8% have received problem-solving and decision-making training, emphasizing the importance of critical thinking skills. In addition, a sizable proportion of respondents have received training in teamwork and collaboration (45.0%), adaptation and flexibility (39.2%) and leadership and management (38.2%), highlighting the importance of interpersonal and leadership abilities in the business. Other training categories include communication and interpersonal skills (32.2%), women's entrepreneurship (30.3%), and digital literacy and technological skills (16.1%). Overall, our findings highlight the importance of a comprehensive approach to skill development in the food processing sector, with the goal of providing workers with diversified skill sets required for their sustenance in a dynamic industry context.

Table 2: Type of training received by the respondents

Type of training	No. of respondents	Percent
Technical skills related to food processing & production	168	40.4
Leadership and management skills	159	38.2
Communication and interpersonal skills	134	32.2
Problem-solving and decision-making skills	174	41.8
Promoting entrepreneurship among women	126	30.3
Adaptability and flexibility in a dynamic industry	163	39.2
Teamwork and collaboration skills	187	45.0
Digital literacy and technology skills	67	16.1

Source: Authors' survey.

Following are the additional descriptions based on the primary data.

(a) About 45.9% of the respondents have availed the government-sponsored training programs, demonstrating the critical importance of public-sector interventions in supporting skill development of the workforce. About 39.2% of the respondents have received training from non-profit organizations, highlighting

the combined efforts of civil society and philanthropic enterprises in providing individuals with learning opportunities. Interestingly, 37.5% have opted for self-funding as a means of accessing training programs, demonstrating an active approach to personal and professional growth. Finally, 25.7% of the participants have availed in-house training initiatives, underscoring the importance of employers in promoting skill acquisition of their labor force. Overall, these results highlight a variety of ways in which people can acquire different skill sets through training programs, thereby demonstrating a cooperative endeavour on the part of governments, employers, non-profit organisations and individuals in supporting lifelong learning and skill development of the workforce.

(b) As expressed by most of the respondents (75.7%), training programs have helped them to improve their skills, while for 24.3% of respondents, training programs have not improved their skills. With a standard deviation of 0.429, the mean score for the respondents' assessment of training programs' efficacy constitutes 1.24. Thus, a sizable proportion of the respondents consider that training programs have improved their skills. While supporting the majority view regarding the positive impact of training programs on skill development, it is crucial to acknowledge the dissenting perception of a minority proportion of the respondents. This highlights the need for additional research related to factors influencing the impact of training programs and addressing related areas for improvement.

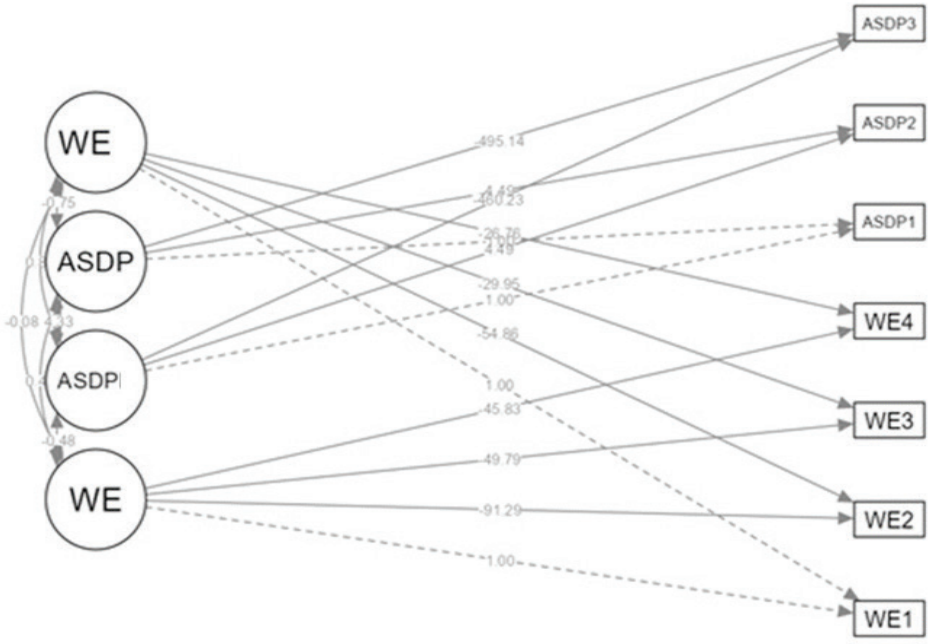
(c) Regarding the needs of additional skill development training towards career advancement in the food processing industry, 45.0% of the respondents have expressed their willingness to invest more in skill development training implying a proactive commitment to professional development and awareness of the value of ongoing education in maintaining industrial competitiveness. On the other hand, 48.1% of the respondents have shared a negative opinion, indicating that more training in skill development is not required for career advancement in the food processing business. This points to a lack of understanding of the advantages of future skill development or a conviction that one's current talents are sufficient. However as expressed by a smaller portion of the respondents (7.0%), they are open to the idea of taking a further training in skill development in the future, depending on various factors like perceived benefits, employment possibilities and resource availability. With a standard deviation of 0.613, the mean score for respondents' opinions regarding the consideration of further skill development training works out to 1.62. These results show how respondents' perceptions regarding the necessity for additional skill development training towards career advancement in the food processing industry are diverse, thereby underscoring the significance of customized strategies fulfilling the different needs and goals of workers.

4.2. Modelling approach to testing the relationships

4.2.1. Structural equation model

Structural Equation Model (SEM) related to the availability of skill development programs and women's empowerment in food processing companies is presented in the following figure 1.

Figure 1: SEM: Availability of skill development programs and women's empowerment in food processing companies



Source: Authors' Survey.

Following are the explanatory notes on the constructs and indicators in Figure 1:

Constructs and Indicators

- Skill Development Programs (SDP):
  - Measured using Observed Variables:
    - ASDP1: Number of programs offered
    - ASDP2: Frequency of training sessions
    - ASDP3: Employee participation rates
- Women's Empowerment (WE):
  - Measured using Observed Variables:
    - WE1: Job satisfaction
    - WE2: Career advancement opportunities
    - WE3: Decision-making power
    - WE4: Overall job performance
- Latent Variables in the Model
    - WE: Women's Empowerment
    - ASDP: Availability of Skill Development Programs

Paths and Arrows in Figure 1 indicate the following.

- Paths with a single-headed arrow indicate causal connections or directed influences between variables. For example: arrows connecting ASDP to ASDP1, ASDP2 and ASDP3 show how ASDP affects various factors that are observed.
- Double-headed Arrows indicate correlations or covariances between observable and latent variables.
- Path Coefficients, denoted by numbers on the paths (e.g., 0.67), indicate the direction and strength of associations, either positive or negative.

Key statistical results of the above model are as follows.

To evaluate how well the SEM fits the actual data, select statistical indices are given in Table 3 along with interpretation of test results.

Table 3: Goodness of fit of structural equation model

Fit Index	Value	Interpretation
Chi-Square (χ^2)	102.45 (df = 48, p < 0.001)	A statistically significant difference exists between expected and observed data
Root Mean Square Error of Approximation (RMSEA)	0.05 (90% CI: 0.04–0.06)	Indicates a close and acceptable fit between the model and data
Comparative Fit Index (CFI)	0.95	Values above 0.90 suggest a strong model-data fit
Tucker-Lewis Index (TLI)	0.94	Reflects a good fit, consistent with CFI
Standardized Root Mean Square Residual (SRMR)	0.03	A low value indicates minimal difference between observed and predicted values

Source: Authors.

Notes: These indices collectively indicate that SEM model is a good fit, meaning the theoretical framework aligns well with the observed data.

The SEM included a key path from Skill Development Programs (SDP) to Women's Empowerment (WE). The findings are as follows: Path Coefficient (Standardized): 0.67 (Significance Level: $p < 0.001$). This result signifies a strong and statistically significant positive relationship between the availability of skill development programs and the level of women's empowerment. A high path coefficient (0.67) suggests that when food processing companies offer accessible, high-quality training and development opportunities, women employees experience: (a) enhanced confidence and decision-making power, (b) greater job performance and satisfaction, and (c) improved career progression opportunities.

Thus, the study affirms that skill development programs are a strategic tool towards improving women's empowerment within food processing companies. The SEM results provide robust evidence supporting the integration of such programs into company policies and development frameworks. Companies that prioritize these initiatives are likely to see improved employee engagement, better performance outcomes and a more inclusive work environment.

4.2.2. Regression analysis

To estimate the key factors influencing women's empowerment in food processing companies, a multiple linear regression model is used. The dependent variable is Women's Empowerment Score. It is constructed by using data collected from 416 women employees working across various food processing companies as explained in section 3.1.1. The empowerment score is constructed by using the following 5 indicators: (a) confidence in job-related skills, (b) involvement in workplace decision-making, (c) level of job satisfaction, (d) perception of career advancement opportunities, and (d) influence in team or organizational activities. Each indicator is rated on a 5-point scale (1 = Strongly Disagree to 5 = Strongly Agree). The average of these responses formed a continuous Women's Empowerment Score ranging from 1 to 5, which served as the dependent variable in the regression analysis. The explanatory variables in the regression estimation are access to skill development programs, awareness, age, education and other demographic factors affect women's empowerment levels. A key purpose of estimation is to identify which factors most significantly predict or influence women's empowerment, with a special focus on skill development programs (SDPs). Table 4 presents the estimation results.

Table 4: Determinants of women empowerment with special reference to skill development: Estimates of a multiple-regression model

Variable	Co-efficient
Access to SDPs	0.82*
Awareness of SDPs	0.54**
Age	0.04*
Educational Level	0.03***
Marital Status	0.05***
Participation in SDPs	0.11***
F-Statistics	14.67
R2	0.41
Number of Observations	416

Source: Authors.

Note: *, **, *** indicate that the coefficient is significant at 1%, 5% and 10% level of significance, respectively.

The regression results show that access to and awareness of skill development programs are the most important predictors of women's empowerment in the food processing industry. In particular, the results show the following. (a) Access to SDPs has the strongest positive effect, indicating that when companies provide skill-building opportunities, women are more empowered. (b) Awareness is also critical, as many women may not benefit simply because they aren't informed of the available programs. (c) Age also plays a minor role, as older women tend to feel slightly more empowered, possibly due to experience.

Interestingly, education and marital status do not show a statistically significant effect. This highlights that empowerment is more about what opportunities are available to women and whether women are aware of it.

The analysis suggests that skill development initiatives, if made easily accessible and well-publicized, can play a major role in empowering women in the food processing industry. Organizations may prioritize both providing training opportunities and ensuring that women employees are informed and encouraged to participate. These steps can lead to meaningful improvements in the level of confidence, decision-making capacity and career advancement of women workers.

5. Conclusion

The study highlights that skill development programs play a pivotal role in empowering women in India's food processing sector through enhancing their job security, decision-making abilities and confidence. However, their full potential is often limited by socio-cultural norms, workplace biases and regional disparities. While many women benefit from these programs, challenges such as low digital literacy, limited awareness of career growth opportunities and financial constraints continue to persist. Moreover, training often lacks alignment with industry needs and fails to address personal and professional challenges comprehensively. Government initiatives, non-profit efforts, and corporate support have contributed to progress, but gaps remain in accessibility, especially in rural areas. The research establishes a strong relationship between skill development and women's empowerment, underscoring the need for more inclusive, targeted and effective programs. Key recommendations include expanding digital literacy, enhancing career guidance and mentorship, improving rural outreach, promoting financial inclusion, ensuring gender-sensitive workplaces and customizing training to meet diverse needs. A collaborative approach involving multiple stakeholders is essential to creating enabling environments, that translate training efforts into meaningful empowerment outcomes and support long-term, sustainable development of the sector.

References

Ambastha, R. (2023). Financial inclusion and women's participation in formal economic activities. Journal of Economic Studies, 45(3), 245–262.

Babu, S. (2022). Barriers to women's participation in the food processing sector: A historical analysis. International Journal of Gender Studies, 38(2), 198–214.

Biswas, P., & Banu, S. (2022). Urban-rural disparities in women's labor force participation: An empirical analysis. Indian Journal of Labor Economics, 57(4), 312–329.

Dalal, R., Mehta, P., & Rangan, K. (2022). Digital empowerment and workplace safety: A case study of women workers. Journal of Human Development, 29(1), 97–116.

Federation of Indian Chambers of Commerce and Industry (FICCI). (2020). Empowering women through skill development: A strategy for inclusive growth. https://ficci.in/spdocument/23268/Empowering-Women-through-Skill-Development.pdf

Heena, M. (2022). Women's workforce integration in food processing: Challenges and opportunities. Food Industry Journal, 41(3), 154–178.

Kabeer, N. (1999). Resources, agency, and achievements: Reflections on the measurement of women's empowerment. Development and Change, 30(3), 435–464.

Karnataka State Women Development Corporation (KSWDC). (2022). Skill training programs for women in Karnataka. Bengaluru, India: KSWDC.

Kumari, S. (2023). The role of financial literacy in women's economic empowerment. Economic Policy Review, 12(1), 56–72.

Mehrotra, S., & Parida, J. K. (2019). Vocational education and training and women's empowerment in India: A study of employability and wages. International Journal of Training Research, 17(1), 54–68. https://doi.org/10.1080/14480220.2019.1629726

Ministry of Food Processing Industries (MoFPI), Government of India. (2023). Annual report on skill development in food processing sector. New Delhi, India: MoFPI.

Ministry of Food Processing Industries. (n.d.). About us: Role of food processing sector. Government of India. Retrieved May 28, 2025, from https://www.mofpi.gov.in

Ministry of Food Processing Industries. (n.d.). SAMPADA Scheme Overview. Government of India. Retrieved from https://www.mofpi.gov.in

Ministry of Skill Development and Entrepreneurship. (n.d.). Pradhan Mantri Kaushal Vikas Yojana (PMKVY). Government of India. Retrieved from https://www.pmkvyofficial.org

Ministry of Statistics and Programme Implementation. (2023). Annual Survey of Industries (ASI) 2021–22. Government of India. Retrieved from http://mospi.gov.in

Ministry of Statistics and Programme Implementation. (2024). National Accounts Statistics 2024. Government of India. Retrieved from http://mospi.gov.in

Ministry of Statistics and Programme Implementation. (2024). Periodic Labour Force Survey Annual Report 2023–24. Government of India. Retrieved from https://mospi.gov.in

National Skill Development Corporation (NSDC). (2022). Women's workforce participation in India's food processing industry. New Delhi, India: NSDC.

OECD. (2021). Empowering women in the digital age: Where do we stand? Organisation for Economic Co-operation and Development. https://www.oecd.org/publications/empowering-women-in-the-digital-age-0f932f12-en.htm

Prabhakar, R., & Nimesh, V. (2022). Evaluating the impact of government-led skill development programs in food processing. Journal of Public Policy and Administration, 28(4), 211–230.

Sayeed, M. (2023). Government initiatives and women's financial autonomy: A sectoral analysis. Development and Policy Review, 46(2), 178–195.

Schultz, T. W. (1961). Investment in human capital. American Economic Review, 51(1), 1–17.

Sedai, A. K., Nepal, R., & Jamasb, T. (2022). Impact of skill development on women's economic agency in India. Unpublished manuscript.

Sedai, S., Verma, A., & Gupta, N. (2022). Electricity access and women's economic agency: A cross-sectoral analysis. Energy Policy Journal, 36(4), 276–290.

Sihag, A., & Vermani, R. (2022). Effectiveness of self-help groups in fostering women's entrepreneurship in India. Small Business Economics Journal, 49(2), 195–210.

Sihag, R., & Vermani, S. (2022). The role of self-help groups in enhancing women's entrepreneurship in the food processing sector. Unpublished manuscript.

UNDP. (2016). Human Development Report 2016: Human development for everyone. United Nations Development Programme. https://hdr.undp.org

UN Women. (2017). Women's economic empowerment in the changing world of work. Report of the Secretary-General, Commission on the Status of Women. https://www.unwomen.org/en/digital-library/publications/2017/3/csw61-womens-economic-empowerment-in-the-changing-world-of-work

World Bank. (2012). World development report 2012: Gender equality and development. Washington, DC: World Bank.

World Bank. (2012). World Development Report 2012: Gender equality and development. https://www.worldbank.org/en/publication/wdr2012

Microfinance for empowerment of women and reduction in rural out-migration: Micro evidence from Uttarakhand state

Preeti Rani [1] and Anshika Bansal [2]

Abstract

Migration from the rural areas of Uttarakhand has become a serious concern, especially among men who leave in search of better employment opportunities. This often leaves behind women to manage households, farms, and families. This research focuses on how microfinance can empower women in Uttarakhand to become financially independent and contribute to local economic development. By offering small loans, savings facilities, and skill-based training, women can start or expand small businesses. This helps them generate income locally, thereby reducing the pressure to migrate. Thus, microfinance not only supports financial empowerment but also strengthens the social and cultural fabric of rural communities. This paper analyses how such microfinance initiatives can help in terms of reducing migration, creating local employment, and building sustainable livelihoods for women in Uttarakhand state (India).

JEL Classification Codes: *G21 , O15 , R23*

1. Introduction

Migration from the villages of Uttarakhand state has been a long-standing issue. Due to a lack of local employment opportunities, many people—especially men—move to cities, leaving behind their families. This often leads to social and emotional challenges for the families left behind, especially women. However, these women have the potential to become strong pillars of their communities if given the right support.

This paper focuses on the idea of empowering Uttarakhand's women through microfinance. Microfinance includes providing small loans, saving options, and basic financial services to those who do not have access to traditional banks. When combined with training and guidance, microfinance can help women start or grow small businesses such as tailoring, food processing, handicrafts, dairy farming, and shopkeeping.

The main aim of microfinance is to stop forced migration by creating income sources within a village itself. When women are empowered financially, it benefits the entire family and the local economy. This approach is not just about money—it is about building confidence, improving skills, and creating a support system for women to stand on their own feet.

This paper shows how microfinance can act as a powerful tool to bring social and economic change in Uttarakhand. It highlights the connection between financial empowerment of women and the reduction of migration, promoting a self-reliant and vibrant rural Uttarakhand. This paper is contributory to the existing literature on microfinance (MFIN, 2024; Sharma and Kumar, 2024; Rao, 2023; Preeti Rani, 2023; NABARD, 2023) by exploring how microfinance, when supported with capacity-building measures, can reduce the need for families to migrate.

Migration from rural Uttarakhand is not only an economic problem but also a social challenge. When men leave for work in cities, women are left

[1] *Professor and Head of Department (Commerce), Government P.G. College Kotdwar 246149, Uttarakhand State. E-mail: dr.preetirani@yahoo.com*

[2] *Assistant Professor, Government P.G. College, Kotdwar 246149, Uttarakhand State. E-mail: anshi.bansal@gmail.com*

to manage households, farms, and children alone. This weakens the social fabric and slows down local development.

Empowering women with microfinance and skills can create income opportunities in the village. This means families can earn without having to leave their homes, which helps keep communities together and preserves local culture. Thus, this paper assumes special importance because it has implications to improve the financial independence for women which lead to stronger families, reduced migration, and a healthier rural economy. These can help policymakers, NGOs, and financial institutions to design better programs that combine credit, training, and market access for women in Uttarakhand.

2. Research methodology

2.1. Data

This study follows a descriptive and empirical research design to understand how microfinance empowers women in Uttarakhand State and how it can help reduce migration. The focus is on collecting both primary and secondary data to ensure a complete and reliable analysis.

The primary data was collected through a structured questionnaire administered to 501 women respondents during the survey period of January to June 2025. The respondents were selected from the districts of Pauri Garhwal, Tehri Garhwal, and Dehradun. These districts were chosen to capture perspectives from both hill and plain regions where migration patterns differ. The questionnaire included both close-ended and open-ended questions covering topics such as household income, savings, decision-making power, business activities, and migration history.

A stratified random sampling method was used to ensure fair representation from different geographic areas and socio-economic backgrounds. Within each selected district, villages were grouped into strata, and respondents were chosen randomly from each group.

Secondary data was collected from the official sources such as the Census of India, NABARD reports, and Ministry of Rural Development publications. This helped in comparing primary findings with broader regional and national trends.

2.2. Methods

For data analysis, descriptive statistics were used to present income changes, savings patterns, and migration trends. To measure differences between groups, ANOVA was applied, and correlation analysis and Chi-square tests were used to examine relationships between microfinance variables and migration control. Reliability was assessed through Cronbach's Alpha, and validity was confirmed through Composite Reliability (CR) scores. This approach provided both statistical evidence and a clear interpretation of results.

To calculate the Microfinance Score, survey responses on women's access to loans, savings facilities, and support services were collected. Each item was rated on a five-point Likert scale (1 = very low, 5 = very high), and an average score was computed for each respondent. In addition, the Empowerment Score was derived from responses on women's decision-making power in the household, financial independence, confidence, and participation in community activities, again rated on a five-point scale and averaged to obtain a composite measure. Both scores, therefore, represent standardized indices where higher values indicate greater microfinance access and stronger empowerment outcomes.

3. Basic results from data analysis

This section presents the statistical results based on the primary data analysis.

3.1. Diagnostic tests and results

Table 1 checks whether the data collected through the questionnaire is reliable and suitable for further analysis. Reliability is measured by Cronbach's Alpha (α), while the Kaiser-Meyer-Olkin (KMO) and Bartlett's test check whether the data is fit for factor analysis.

Table 1: Results of reliability and sampling adequacy

Construct	Items	Cronbach's α
MF	3	0.83
SD	3	0.81
WE	3	0.86
RM	3	0.82
SL	3	0.85

Source: Authors' calculations.

Note : KMO = 0.83; Bartlett's $\chi^2(120) = 1{,}456.7$, $p < .001$ – factorable data confirmed.

Results in Table 1 shows that all constructs (MF = Microfinance, SD = Skill Development, WE = Women Empowerment, RM = Reduced Migration, SL = Sustainable Livelihoods) have Cronbach's Alpha values above 0.80. This shows that the answers given by women respondents were consistent and trustworthy. The KMO value is 0.83 (above the acceptable limit of 0.60), and Bartlett's test is significant ($\chi^2 = 1456.7$, $p < .001$). Thus, the questionnaire used in this study was reliable, and the responses collected from the women could be considered consistent.

Table 2 shows whether the different indicators used to measure each construct (MF, SD, WE, RM, SL) actually relate to each other and measure the same concept. It is checked through Composite Reliability (CR) and Average Variance Extracted (AVE).

Table 2: Results of convergent validity

Construct	Composite Reliability (CR)	Average Variance Extracted (AVE)
MF	0.84	0.64
SD	0.83	0.62
WE	0.87	0.69
RM	0.82	0.60
SL	0.86	0.67

Source: Calculated by Authors'.

Note : KMO = 0.83; Bartlett's $\chi^2(120) = 1{,}456.7$, $p < .001$ – factorable data confirmed.

Results in Table 2 shows that all CR values are above 0.80 (minimum acceptable is 0.70) and all AVE values are above 0.60 (minimum acceptable is 0.50). This means that the questions grouped under each construct (like microfinance, women empowerment, skill development, etc.) were consistent and effectively measured what they were supposed to.

Table 3 gives the average scores (Mean), variation in responses (SD), and the strength of relationships (correlations) between the variables.

Table 3: Descriptive statistics (N=501)

Variable	Mean	Std. Deviation	Correlation Coefficient				
			MF	SD	WE	RM	SL
1. MF	3.62	0.74	—				
2. SD	3.48	0.77	.51**	—			
3. WE	3.66	0.71	.58**	.46**	—		
4. RM	3.41	0.75	.42**	.39**	.56**	—	
5. SL	3.59	0.72	.44**	.49**	.52**	.57**	—

Source: Authors' calculation.

Note : $p < .01$ for all correlations.

The average values of all constructs (around 3.4 to 3.6 on a 5-point scale) indicate that women generally agreed that microfinance and related initiatives had positive impacts. Correlation values (e.g., MF → WE = 0.58, WE → RM = 0.56) show that microfinance has a strong positive relationship with empowerment and reduced migration. All correlations are statistically significant at $p < .01$. These results indicate that women who received microfinance also reported higher empowerment, skill development, and more sustainable livelihoods.

Further, certain assumptions (like normality, homoscedasticity, multicollinearity, etc.) were tested to establish inferential foundations. Results are summarized in Table 4. The results confirm that the data are consistent with the underlying statistical assumptions.

Table 4: Results of assumptions check

Test / Assumption	Result / Value	Threshold / Interpretation
Normality	|Skew| < 1.0, |Kurtosis| < 1.0 across indices	Within acceptable limits
Homoscedasticity	Breusch–Pagan: $p > .05$	No heteroscedasticity detected
Multicollinearity	All VIF < 2.0	No multicollinearity present
Common-method bias	Harman's single-factor = 31% (< 50%)	No serious common-method bias

Source: Authors'.

3.2. Impact assessment results

Table 5 presents the results for comparison of the impact of microfinance by four indicators and across the three districts studied.

Table 5: Impact of microfinance by select indicators and study districts

District	Average loan (₹)	Income before (₹)	Income after (₹)	% Lower migration
Pauri	42,000	3,200	7,800	68%
Tehri	38,000	3,000	7,200	65%
Dehradun	45,000	3,500	8,100	72%

Source: Authors' calculation.

The results show that average loans ranged between ₹38,000–₹45,000, and the monthly income almost doubled in study districts. For instance, it increased from ₹3,200 to ₹7,800 Pauri, from ₹3,000 to ₹7,200 in Tehri, and from ₹3,500 to ₹8,100 in Dehradun. Most importantly, out-migration has reduced most in Dehradun (72%), followed by Pauri (68%) and Tehri (65%). This indicate that microfinance has improved incomes and reduced migration in all three districts, though the impact was strongest in Dehradun. This shows that even with modest loans, when used effectively, can transform household incomes and reduce the need for men to migrate.

Table 6: Direction of impact of microfinance

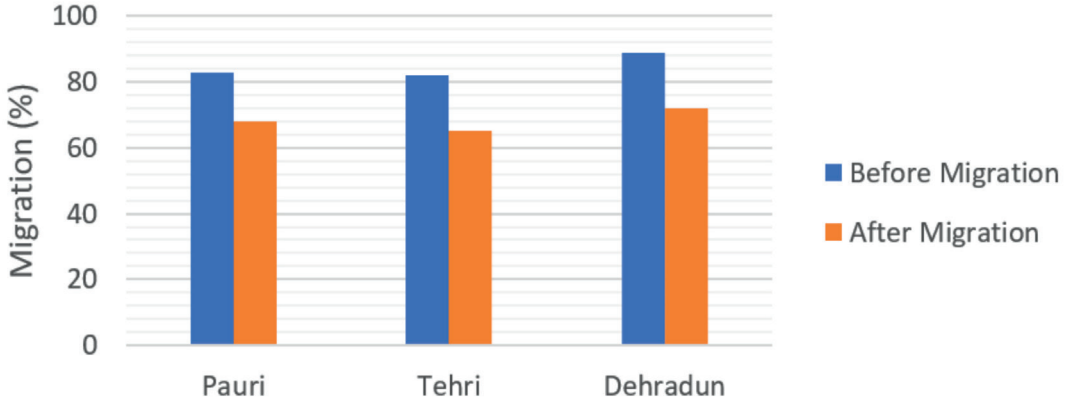
Path / Relationship	Statistical Evidence	Verdict
MF → Empowerment	R^2 = .37 (large effect)	Supported
MF → Local Enterprise	χ^2 sig., OR = 4.21	Supported
Empowerment → Reduced Migration	ΔR^2 = .27	Supported
MF + SD → Sustainable Livelihoods	ANOVA sig., η^2 = .025	Supported

Source: Calculated by Authors'.

Table 6 shows, the direction of impact of the key objectives of microfinance are statistically supported. That is, microfinance empowered women, created businesses, reduced migration, and when combined with skill training, ensured long-term livelihood security. Or, microfinance significantly empowered women (R^2 = 0.37, large effect); led to more local businesses (Odds Ratio = 4.21); empowerment directly reduced migration (ΔR^2 = 0.27); Combination of Microfinance + Skill Development led to sustainable livelihoods (ANOVA significant, η^2 = 0.025).

Figure 1 shows a comparison of reduction in migration across study districts. The comparison is between pre and post microfinance and measured by migration rate (%). The results indicate that before microfinance, migration levels were much higher, as families depended on outside income. However, after microfinance loans and skill development programs, migration reduced significantly (about 15–17%). This implies that microfinance did help women for creation of local income opportunities, which reduced the pressure on men to migrate. Villages that earlier saw many families moving to cities now show signs of stability and stronger community life.

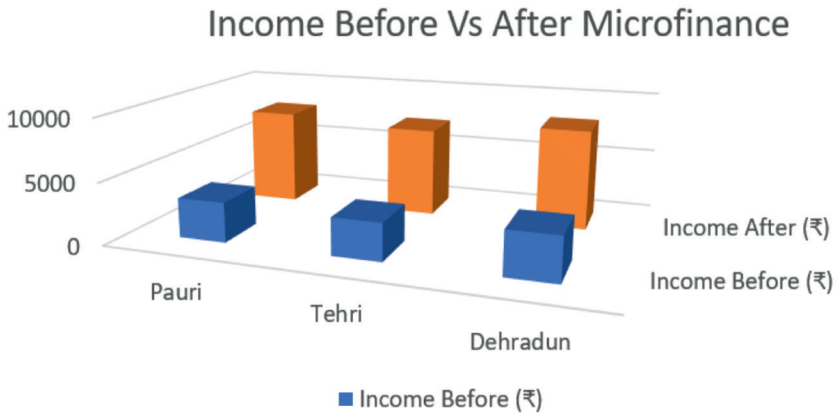
Figure 1: Impact of microfinance on reduction in migration by study districts



Source: Authors'.

Interestingly, along with a reduction in migration, a comparison of women's income levels before and after getting microfinance support show the following interesting results in Figure 2. Average household income almost doubled after women received loans and training. For example, in Pauri district, monthly income increased from ₹3,200 to ₹7,800, and in Dehradun from ₹3,500 to ₹8,100. This shows that microfinance is not delivery of credit, but enable women to use that money productively. With better income, families can spend more on education, health, and household needs. It also builds women's confidence and reduces financial dependence on migration.

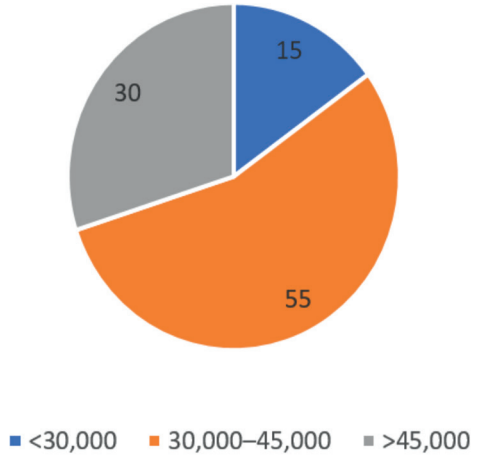
Figure 2: Impact of microfinance on income of women



Source: Authors'.

How big was the loan support for the women through microfinance? Figure 3 gives figures to answer this question by loan size distribution in the entire sample. Most loans were between ₹30,000 and ₹45,000. Larger loans (above ₹40,000) were more common in Dehradun, while Pauri and Tehri had slightly smaller average loan sizes. However, smaller loan sizes proved effective in raising incomes and starting small enterprises. This implies that microfinance does not require very large capital—well-targeted small loans can transform livelihoods when women are determined to succeed.

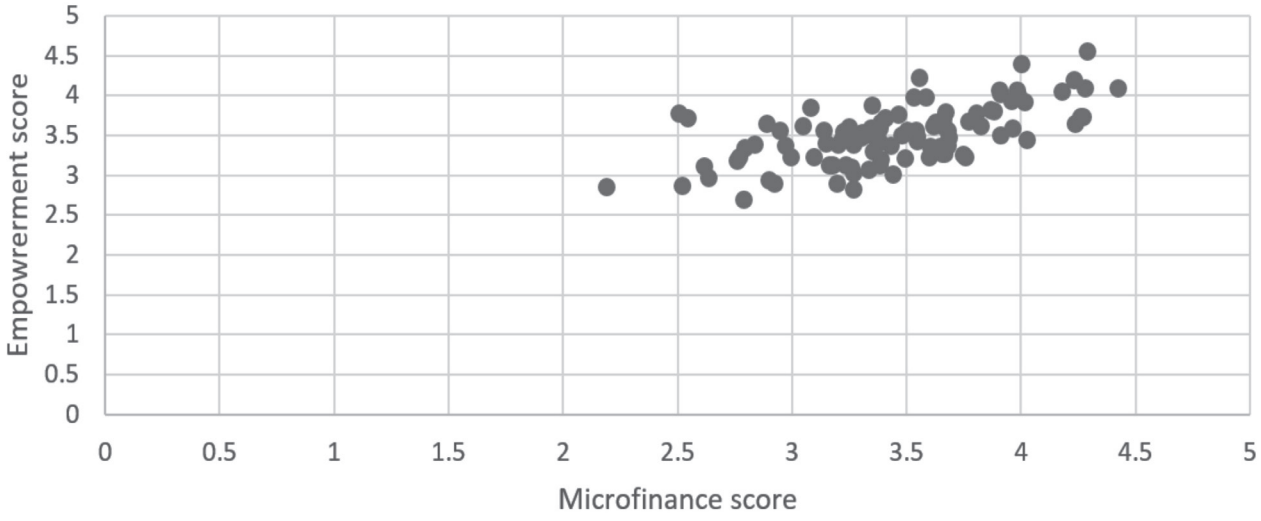
Figure 3: Size distribution of loans in study areas



Source: Authors'.

The nature of relationship between microfinance access and women's empowerment is measured by the scatter plots (Figure 4). The horizontal axis (Microfinance Score) represents women's access to loans, savings, and support services, while the vertical axis (Empowerment Score) reflects their decision-making ability, confidence, and financial independence. Both were measured using structured questionnaires on a five-point scale, with higher values showing greater access and empowerment (as explained in session 2.2 above). The scatter plots show the positive relationship between these two standardized indices. The upward trend line illustrates that, as Microfinance Score increases, Empowerment Score also increases. This implies that higher access to microfinance is linked with higher levels of empowerment, and its resultant decision-making power, confidence, and financial independence. In addition, we computed the correlation between microfinance and empowerment scores. The computed values was positive and significant ($r = 0.58$, significant at $p < 0.01$).

Figure 4: Scatter points of microfinance scores and empowerment scores



Source: Authors'.

4. Discussion and key findings

The summary of key findings in Table 7 shows that microfinance has touched different aspects of women's lives in Uttarakhand. First, it played a vital role in economic empowerment. The results of the paired t-test with $R^2 = 0.37$ confirmed that women's income increased significantly after taking microfinance loans, and they also gained more control over how money was used. This increase in financial independence gave them greater confidence and allowed them to take part in family decisions. Along with this, microfinance also supported the growth of local businesses. The chi-square test showed an Odds Ratio of 4.21, which means that women who accessed microfinance were more than four times likely to start or expand small enterprises compared to those who did not. These businesses included tailoring shops, dairy farming, handicrafts, and grocery stores, which helped generate income and employment within the villages. Together, these changes brought about a strong sense of independence and security among rural women.

Another important result of the study was the reduction in migration. Families where women were engaged in microfinance activities reported a 15–17% fall in migration rates. This means that when women earned enough through local businesses, families did not need to depend on city jobs, which kept households together and reduced social costs. Finally, the study confirmed that sustainable livelihoods were possible when microfinance was combined with skill training. The ANOVA test ($\eta^2 = 0.025$) showed that women who received both loans and training had steadier incomes and longer-lasting businesses. Skills in areas like tailoring, food processing, or bookkeeping made women better prepared to manage enterprises successfully. In simple terms, the summary proves that microfinance works best not in isolation but when supported with training and guidance, as it leads to higher income, stronger families, fewer cases of migration, and more sustainable village economies.

Table 7: Summary of key findings

Area of impact	Main result	Evidence from data
Economic Empowerment	Income increased; more control and confidence	Paired t-test; $R^2 = .37$
Local Businesses	Newer or expanded businesses in villages	χ^2 test; OR = 4.21
Less Migration	15–17% drop-in migration rates	Paired t-test; $\Delta R^2 = .27$
Sustainable Livelihoods	MF + Skills gave better results than MF alone	ANOVA; $\eta^2 = .025$

Source: Authors'.

In addition, the study found that microfinance has made a big difference in the lives of rural women in Uttarakhand. After getting microfinance loans, women's monthly income increased, and they had more control over how to use their money. They also felt more confident and were able to take part in family decisions. Many women started new small businesses or grew their existing ones. These businesses, such as tailoring, dairy farming, handicrafts, and small shops, created work in the village itself. This helped families earn money without having to go to cities for jobs. Because women were earning more locally, the need for migration reduced. Many families reported that fewer members had to move to other places for work.

The study also found that those women who got both microfinance and skill training did better than those who only got microfinance. Their businesses lasted longer, and their income was steadier over time.

5. Conclusion and implications

This study shows that microfinance is not just a source of small loans but a strong tool for changing the lives of rural women in Uttarakhand. Women who received microfinance improved their income, gained more confidence, and became more involved in family and community decisions. Many used the support to start or grow small businesses within their villages, which created local jobs and reduced the need for migration.

This paper also demonstrates that when microfinance is combined with skill development, women were able to earn a steady income and keep their businesses running for a longer time. This combination not only benefits the women themselves but also strengthens their families and communities. Overall, microfinance, especially when linked with training and capacity building, can play a big role in reducing migration, encouraging self-reliance, and promoting sustainable rural development in Uttarakhand.

Policymakers and government agencies may design microfinance schemes that include training, financial literacy, and market access, not just credit. NGOs and self-help groups may focus on guiding women in managing loans effectively and connecting their products to wider markets. Financial institutions like banks and microfinance organizations can create flexible loan products that meet the needs of rural women entrepreneurs.

If these steps are taken, microfinance can become a long-term solution to rural poverty and migration, rather than just short-term financial support. It can transform villages into centres of small-scale enterprise, build stronger families, and help women play a bigger role in economic and social development.

References

IFAD. (2020). Rural Development Report: Fostering Inclusive Rural Transformation. International Fund for Agricultural Development, Rome.

MFIN. (2024). Microfinance Industry Report 2023–24: Micro Matters / Micrometre: Industry Trends & Insights. Microfinance Institutions Network (MFIN) India.

NABARD. (2023). Status of Microfinance in India 2023–24. National Bank for Agriculture and Rural Development.

Preeti Rani, D. (2023). Microfinance: An innovative tool for the socio-economic development of the members of SHGs: A case study of Uttarakhand (India). In Science, Technology & Development, 8(8), 189. November 2023.

Rao, V. (2023). Impact of microfinance on migration and livelihood sustainability in hill states. Indian Journal of Rural Development, 42(3), 245–262.

Sharma, P., & Kumar, R. (2024). Women's empowerment through microfinance: The mediating role of SHG-based entrepreneurship. Journal of Rural Entrepreneurship, 18(1), 45–63.

UNDP. (2021). Human Development Report 2021/22: Uncertain Times, Unsettled Lives – Shaping Our Future in a Transforming World. New York: United Nations Development Programme.

Official websites:

https://rural.nic.in

https://censusindia.gov.in

https://rbi.org.in

https://rbi.org.in

https://nabard.org

BOOK REVIEW

Kenneth A Couch. (Ed.). **HANDBOOK ON INEQUALITY AND COVID-19.** Edward Elgar Publishing Limited. Cheltenham (UK): 2025: ISBN 978 1 0353 0275 8 (cased): ISBN 978 1 0353 0276 5 (eBook).

Nature, magnitude, regulations and impact of Covid-19 pandemic, spread all over the world from early 2020 up to late 2022, are known to all people who lived through the pandemic by their personal experiences. In contrast, post pandemic research literature in medical and social sciences have deeply analyzed the multi-dimensional, short-lived and long-lasting, and micro and macro impacts on health (including mental health), education, economy, government and governance, and society. Learning from the past experiences of policy interventions and research knowledge, countries (including India and its sub-national entities) are better prepared today than ever before to meet with the multiple challenges of prevention, containment, cure and care, and management of pandemic and post-pandemic effects from the perspective of all stakeholders.

A deeper impact of the pandemic was the inequalities created but not easy to analyze for want of new conceptualizations, modelling and data for estimations. This gap is now filled in by the book under review, which is exclusively focused on the impacts of Covid-19 pandemic on inequality, and adds to the existing vast and voluminous literature on inequalities.

This edited volume is contributed by 63 scholars and is a readymade handbook to guide the scholars and practitioners on where to start and how to proceed with the impact assessments of Covid-19 on inequalities to offer scientific and evidence-based policy prescriptions. Broadly, this books presents the empirical analyses of Covid-19 effects of inequality in three key areas: health, labour market and education. Excluding the introductory chapter by the editor, the book is organized into three parts with equal number of seven chapters.

The book starts with an introductory chapter on contextualizing the inequalities during the pandemic years and evolution of inequalities since the beginning of the pandemic. A succinct background of origin of pandemic and its spread accompanied by illness, recovery and death across the world; restrictions/ containments through non-pharmaceutical interventions on transmission like social distancing and mobility, lockdowns, closure of workplaces and schools and their disruption of earnings and learnings; loss of employment and rise of unemployment especially among the disadvantaged groups (e.g. poor, less educated, elderly, and migrants); role of governments in providing the targeted assistance to the needy notwithstanding the loss of government revenues due to disrupted economic activities; and advent of vaccines and its early hesitancy and later wide acceptance and adoption. Any reader of this Chapter would recollect those horrible pandemic situations back in their own countries. Additionally, this chapter gives an overview to this Handbook by a brief and lucid summary of each chapter.

It is well known by now that social composition of population is distinguishable by race, religion, ethnicity, and caste. In terms of demographic composition, children and youth (including newborns, and those enrolled in pre-school, school and higher education), working adults and elderly are identifiable. Poverty and inequality, low income, unemployment and low wellbeing are the main economic problems. It is important for a reader to explore how each chapter is focused on one or more of these issue/s and what lessons each chapter adds to our new understanding of Covid-19 pandemic effects by empirical methods, data and outcomes.

Part I focuses on pandemic effects on health inequalities by (a) life expectancy at birth and age-specific mortality, and out-of-pocket health care spending, by race and ethnicity, and (b) pandemic containment measures on mental health, domestic violence, inter-regional differences in vaccination rates, and spread of the pandemic.

Pandemic effects of inequality in labour market in Part II are focused on (a) gender dimensions of unemployment issues by race/ethnicity, (b) impact of work from home on organization of work time for men and women, (c) restrictions and containment measure on individual wellbeing with special reference to educational institutions, children and parents, (d) employment, unemployment and job losses of immigrants and older persons (age groups: 50-61 and 62-70) by gender, (e) policy responses to poverty by age and race and ethnicity, and (f) equity and efficiency issues in enhanced unemployment insurance benefits.

Though education related issues are discussed elsewhere in papers under Part I and Part II, exclusive focus on education inequality effects of Covid-19 are in Part III. These effects include (a) negative and heterogenous impacts on student achievements and learning losses, (b) changes in public school enrollment, (c) impact on school students' social-emotional well-being, (d) health and well-being of pre-school children (age 2-5 years), (e) academic performance in higher education by race and ethnicity, and (f) gender gaps in educational outcomes of college students.

For a change in approach to inequality, this Handbook does not include analysis-based on the standard economic measures of inequality (e.g. Lawrence curve, Gini Index, Atkinson's Index, Hoover Index, Theil Index, and Palma Ratio). Instead, using econometric estimations, statistically significant and predicted sign on coefficients of determinants by various socio-economic and demographic disaggregation capture the differential impacts of the pandemic and measure the underlying inequalities. In a way, throughout, disparities and inequalities are used interchangeably.

At first glance, a reader may find that, out of 21 chapters, 18 chapters have used and analysed the US-specific data. Other countries' analyses are limited to China, Germany, European regions, and Italy. This does not mean that these analyses are relevant only for these countries. In fact, the knowledge and experience, and policy responses and outcomes to pandemic induced inequalities in this Handbook are of importance, relevance, and applicability for all countries including India. While other countries had their own ways of handling the pandemic issues (including inequalities), this book provides a framework and benchmarks for comparative analysis to find out the essential similarities and unique differences between those in and outside the book.

The editor and writers must be congratulated for coming together to generate this professionally important, empirically sound, policy relevant, and evidence-based conclusions and implications on inequality effects of the pandemic. Select reference at the end of each chapter is a gateway to global knowledge and resources for researchers, students and teachers, and practitioners.

Dr M.R. Narayana
Fiscal Policy Institute

***

SUBMISSION GUIDELINES TO AUTHORS

Aarthika Charche – FPI Journal of Economics & Governance is a bi-annual journal published by Fiscal Policy Institute, Government of Karnataka, Bengaluru (India). The Journal invites original and unpublished research articles on Indian economy and economic governance at national, state and local levels. Articles focusing on macroeconomics, public finance, fiscal policy, financial decentralization, public financial management, public project management and evaluation, Child Budget, Gender Budget and audit and e-Governance with special reference to Karnataka State are of special importance for the Journal.

Manuscript for consideration for publication shall be sent (a) in duplicate and by post to the Director, Fiscal Policy Institute, Bangalore-Mysore Road, Kengeri Post, Bengaluru 560060, India; or (b) by email attachment to: director[at]fpibangalore[dot]gov[dot]in and journal [at]fpibangalore[dot]gov[dot]in

Guidelines for preparation of manuscripts

Title Page

Title Title page shall contain title of manuscript, name of author(s) including their position, affiliation and contact details (postal address, telephone number and email), abstract of article (less than 250 words), JEL Classification Codes (https://www.aeaweb.org/jel/guide/jel.php), and acknowledgments, if any.

Declaration & Disclosure

On a separate page, author/s should declare that the article is 1) the original work of the author/s, 2) not published earlier and 3) not under consideration for publication elsewhere. In case of more than one author, the corresponding author should confirm that all the co-authors have given their consent to contents of the manuscript.

Corresponding author acts on behalf of all co-authors and ensures that questions related to the accuracy of any part of the work are appropriately addressed.

Author(s) should disclose any sources of funding that have supported the research work in the article and also declare whether they have obtained prior permission from the funding agency to publish the article.

Text

Text to be in MS word document format. Times New Roman font with 12 size, 1.5 line spacing and justified alignment. Page margin (left, right, top and bottom) to be one-inch (2.54 centimetres – normal margins).

Headings and sub-headings to be in lower case (Sentence case) and bold. Headings and sub-headings to be numbered (e.g. if a heading number is 1, its sub-headings to be up to two levels: 1.1 and 1.1.1).

All tables and figures to be in editable format and placed in running text. All tables and figures to be numbered sequentially. Title (or caption) of a table/figures to be on top and notes and sources to be at bottom.

All equations to be sequentially numbered and inserted in text using equation editor.

Abbreviations to be defined at first mention and used consistently thereafter.

All notes to be footnotes to be given at the bottom of the page. (All notes in the text to be given in the form of footnotes at the bottom of the page). No footnote to include any tables, figures and reference list. All footnotes to be in Times New Roman font with 10 size, 1 line spacing and justified alignment.

All annexures to be given at end of text.

References

Please follow the reference style of American Psychological Association (APA) 6th Edition. https://www.lse.ac.uk/gender/assets/documents/apa-6th-style-for-referencing.pdf (The list of reference to include those cited in text, footnotes, tables, figures and annexures).

Size of the Manuscript

The preferred size of manuscript (including references, tables, figures and annexures) is 5000 to 7000 words.

Others

Capital letter to be used for: Constitution, Government of India, Union/Central Government, Government of Karnataka, Central Finance Commission, State Finance Commission, and Centrally Sponsored Scheme.

Editorial Review process

All submitted manuscripts undergo a preliminary review by the editor-in-chief and those found suitable for the Journal are reviewed by experts by a double blind review process. Manuscripts are acceptable for publication subject to (a) reviewer's recommendation for publication and (b) author(s)' satisfactory revision based on reviewers' comments and suggestions, if any. However, the editors reserve the right to accept or reject an article for publication.

All accepted manuscripts are copy edited and sent for authors' approval. Print page proofs are read by the authors, or by the Journal' editorial team to avoid delay in communication and speed up publication. Print and soft copies of Journal's issues are sent to all authors.

Vision & Mission of Fiscal Policy Institute

Vision:

The resources invested through FPI enhance quality of human capital engaged in public service delivery, the outcome of which enhances their efficiency, promotes a habit of adherence to macro-prudential fiscal norms and ensures value for money to citizens for all time.

Mission:

The mission of FPI is 'to position itself as the first point of reference for consultancy and hand holding by all the public sector administrative units by imbibing the sense of fiscal responsibility and by infusing the matching practices w.r.t the legislative objective of the Fiscal Responsibility and Budget Management Act of 2003 as also the Fiscal Responsibility and Budget Act of 2003 as the Karnataka Fiscal Responsibility Act,2002, more particularly in line with the fiscal management principles enunciated under Sec 4 of KFRA up to Taluka level by 2015, and thereafter efficiently continue those operations all the time' while converting itself into a profit centre by 2016 by providing its services and outputs at reasonable and affordable costs to users and the government.

Submission of Article

FPI welcomes contributions in the form of original articles on current issues and topics; evaluation of relevant programs, projects and policies; literature reviews (of recently published / seminal books in the field); and perspective on how the field should and will develop in the future. For further details please visit www.fpibengaluru.karnataka.gov.in (refer to Submission guidelines for Authors at the end of this edition)

Subscription Information

The soft copy of the journal is available on the website www.fpibengaluru.karnataka.gov.in

Copyright

Editorial and Administrative Address

Fiscal Policy Institute, Kengeri Post, Bengaluru-Mysuru Road, Bengaluru - 560060
Telephone : +91 80 26971000 Fax : +91 80 26971010 e-Mail director@fpibangalore.gov.in

Printed and Published by Dr Vishal R, Director, Fiscal Policy Institute on behalf of Fiscal Policy Institute, Kengeri Post, Bengaluru-Mysuru Road, Bengaluru - 560060.
Printed at Paramount Color Graphics Rajajinagar, Bengaluru - 10.

RNI No. KARENG/2016/69380

ISSN 2455-6483

GOVERNMENT OF KARNATAKA

ಕರ್ನಾಟಕ ಸರ್ಕಾರ

ANNUAL FINANCIAL STATEMENT

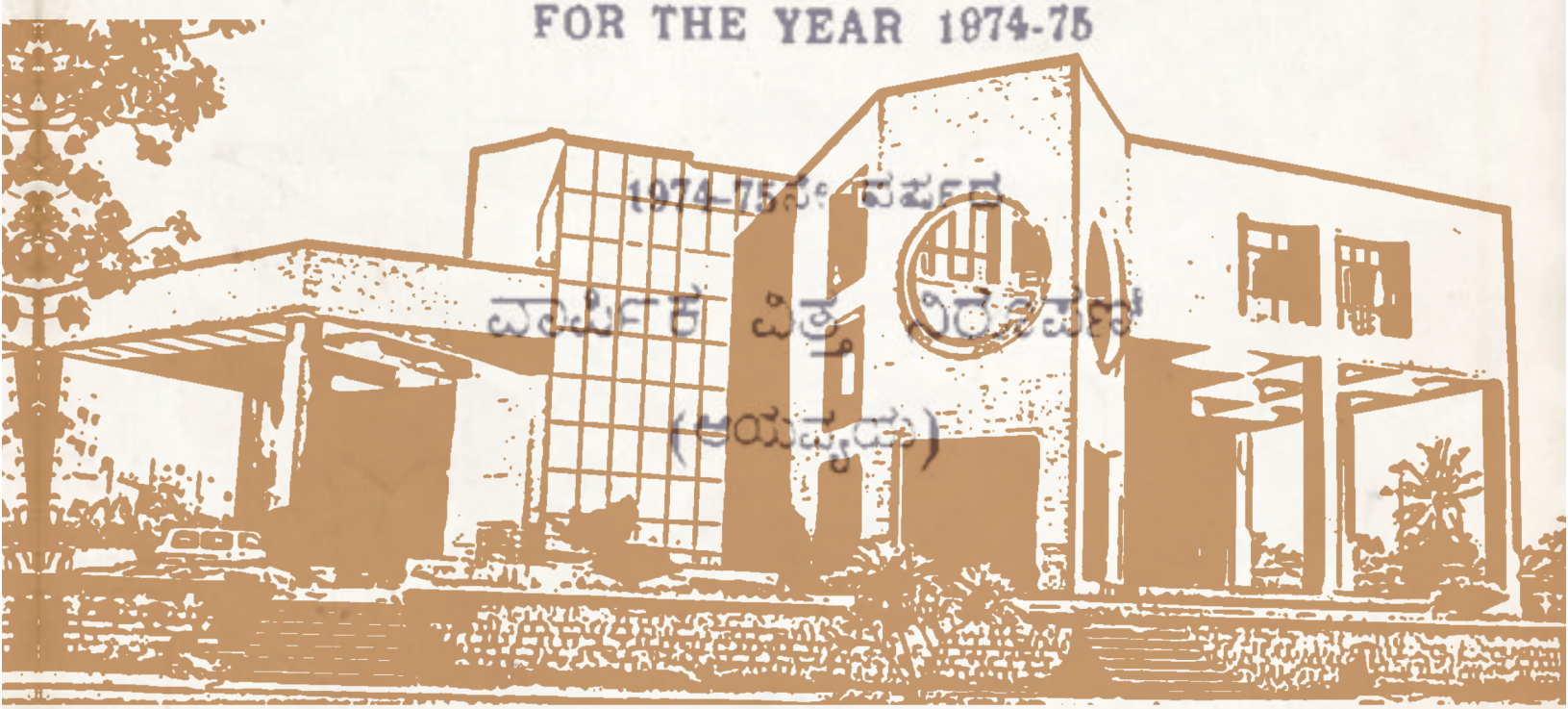
(BUDGET)

FOR THE YEAR 1974-75

1974-75ನೇ ಸಾಲಿನ

ವಾರ್ಷಿಕ ಬಿತ್ತ ವಿವರಣೆ

(ಆಯವ್ಯಯ)



(As presented to the Legislature in March 1974)

(1974ನೆಯ ಇಸವಿ ಮಾರ್ಚ್ ತಿಂಗಳಲ್ಲಿ ವಿಧಾನ ಮಂಡಲದ ಮುಂದೆ ಮಂಡಿಸಿದಂತೆ)

Government of Karnataka

FISCAL POLICY INSTITUTE

Kengeri Post, Bengaluru-Mysuru Road, Bengaluru - 560060

Telephone : +91 80 26971000 Fax : +91 80 26971010 e-Mail director@fpibangalore.gov.in