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Role and Strategy of The RBI in Economic Development.

Subhajyoti Majumder[1]

Abstract

The Reserve Bank of India (RBI) occupies a central position in India's economic architecture as the principal authority responsible for monetary management, financial regulation, and macroeconomic stability. Established under the Reserve Bank of India Act, 1934, and commencing operations on 1 April 1935, the RBI has evolved from a traditional regulator of currency and credit into a modern central bank responsible for monetary policy formulation, banking supervision, foreign exchange management, currency issuance, financial stability, and economic development. The primary objective of monetary policy, as incorporated through the2016 amendment to the RBI Act, is to maintain price stability while keeping in mind the objective of growth.

The role and strategy of the RBI in economic development are examined within the context of the evolution of India's monetary policy framework. It traces the transition from direct monetary controls and administered interest rates to a market-oriented and rule-based framework. Major milestones include the Monetary Targeting Framework introduced following the recommendations of the Sukhamoy Chakravarty Committee, the Multiple Indicator Approach adopted in 1998, and the Flexible Inflation Targeting (FIT) framework introduced in 2016. The FIT framework established an inflation target of 4 per cent with a tolerance band of +/- 2 per cent and adopted the Consumer Price Index (CPI-Combined) as the principal measure of inflation.

A major institutional reform was the establishment of the six-member Monetary Policy Committee (MPC) under the amended RBI Act, 1934. The MPC introduced a transparent, accountable, and collective approach to monetary policy decision-making and determination of the policy repo rate. The recommendations of the Urjit Patel Committee and the subsequent modifications introduced by the Government are also examined, as they generated important debates regarding the autonomy of the RBI and the institutional framework of monetary policy.

1. Retired DGM, Dena Bank., Guest Faculty Member, Rabindra Shiksha Sammillani Law College, Kolkata., Guest Faculty Member: Loreto College, Kolkata., Guest Faculty Member, IIBM, Guwahati, and IIBF, Kolkata.

The objectives of monetary policy discussed include price stability, economic growth, financial stability, liquidity management, exchange-rate stability, employment generation, and balanced economic development. A comparative analysis of the monetary policy objectives of major central banks, including the Federal Reserve, European Central Bank, Bank of England, Bank of Japan, and People's Bank of China, highlights the common emphasis on inflation control, financial stability, and sustainable growth.

Both quantitative and qualitative instruments of monetary policy are examined with particular reference to their role in regulating liquidity, credit availability, interest rates, inflation, and financial stability. . The principal quantitative instruments include the Liquidity Adjustment Facility (LAF), Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR), Open Market Operations (OMOs), and Bank Rate. Within the LAF framework, particular attention is given toRepo Rate, Reverse Repo Rate, Variable Rate Reverse Repo (VRRR), Marginal Standing Facility (MSF), Standing Deposit Facility (SDF), Long-Term Repo Operations (LTROs), Targeted Long-Term Repo Operations (TLTROs), and TLTRO 2.0. The principal qualitative instruments discussed include margin requirements, credit rationing, moral suasion, direct action, and selective credit controls. These instruments collectively enable the RBI to regulate liquidity, credit availability, interest rates, inflation, and financial stability.

Special emphasis is placed on the evolution of the monetary policy transmission mechanism from the Benchmark Prime Lending Rate (BPLR) and Base Rate systems to the Marginal Cost of Funds Based Lending Rate (MCLR) framework and subsequently the External Benchmark-Based Lending Rate (EBLR) framework. Although EBLR has improved transparency and accelerated transmission of policy rate changes, it has also led to concerns regarding unequal transmission across categories of borrowers. While many large corporate borrowers continue to access credit under MCLR-linked or negotiated arrangements, retail and MSME borrowers are generally subject to faster transmission of policy rate changes. Consequently, increases in borrowing costs are often passed on more rapidly to MSMEs, which contribute

Approximately 31.1 per cent of India's GDP and about 48.58 per cent of its exports. Such asymmetry may adversely affect investment, employment generation, production, and export competitiveness.

The historical relationship between the RBI and the Government is also examined, highlighting the importance of central bank independence for maintaining policy credibility, investor confidence, inflation control, and macroeconomic stability. Overall, effective monetary policy transmission, balanced credit allocation, protection of MSMEs from disproportionate interest-rate burdens, preservation of RBI autonomy, and continuous refinement of the monetary policy framework remain essential for achieving price stability,

financial stability, sustainable growth, employment generation, and inclusive economic development in India.

It is concluded that while the RBI has significantly strengthened the credibility and effectiveness of monetary policy through institutional reforms such as the Monetary Policy Committee and the Flexible Inflation Targeting framework, several challenges continue to require careful policy attention. These include improving the efficiency and equity of monetary policy transmission, safeguarding the interests of MSMEs and other vulnerable borrowers, maintaining an appropriate balance between inflation control and economic growth, and preserving the operational autonomy and institutional credibility of the RBI. Addressing these issues will be crucial for strengthening the effectiveness of monetary policy and promoting sustainable and inclusive economic development in India.

Keywords: Monetary Policy, Flexible Inflation Targeting, LAF, MCLR, and EBLR.

Introduction:

One of the principal objectives of every nation, specially developing and emerging economies, is to formulate and implement appropriate strategies for economic development.

Economic development is a wider concept than the growth of the economy of a country, as it is not calculated only through the increase or decrease in national income or gross domestic product. It implies the overall development of economic welfare with the sustained upward movement of output. It is directly related to improvement in structural transformation of the economy, living standards, productive jobs, and human development. On the other hand, it reduces poverty and inequality of income in the country.

Monetary policy plays a crucial role in influencing the pace and pattern of economic development. As per the RBI Act, 1934, as amended in 2016, the primary objective of monetary policy is to maintain price stability while keeping in mind the objective of growth. This is achieved through the regulation of money supply and interest rates, thereby containing inflation, ensuring financial stability, and supporting sustainable economic growth. The effectiveness of monetary policy depends largely on the appropriate choice of policy instruments, the efficiency of the monetary policy transmission mechanism, and the accurate assessment of prevailing economic conditions.

Meaning of Monetary Policy:

Monetary policy refers to the framework adopted by the central bank, such as the RBI to regulate the supply of money, interest rates, and the availability of credit in the economy, with the objectives of maintaining price stability, promoting economic growth, and generating employment. Similar objectives are pursued by various other central banks

across the world, such as the Federal Reserve in the USA, the European Central Bank, and the Bank of England, although their specific mandates and policy priorities may differ.

Historical Background of the RBI and Evolution of the Monetary Policy Framework:

The Reserve Bank of India (RBI) was established under the RBI Act, 1934, and began its operations on 1 April 1935 as a privately owned shareholders' bank. After its nationalisation on 1 January 1949, the RBI became fully owned by the Government of India.

As per the preamble of the RBI Act, 1934, the RBI is empowered to issue bank notes and is also required to maintain reserves for ensuring monetary stability in India. The RBI is also empowered to operate the currency and credit system for the benefit of the country.

Although the Act did not specifically mention inflation targeting or price stability, the RBI's monetary policy gradually evolved over the years to pursue two major objectives: maintaining price stability and ensuring an adequate flow of credit to promote economic growth. The RBI seeks to maintain a balance between these objectives in accordance with prevailing economic conditions. While formulating monetary policy, the RBI also takes into account macroeconomic and financial stability.

Sir Osborne Arkell Smith, an Australian national, became the first Governor of the RBI in April 1935. He was a highly experienced banker who devoted his professional life to the banking sector. Later, Sir Chintaman Dwarakanath Deshmukh was appointed Governor on 11 August 1943 and became the first Indian to hold this position.

Since its establishment, the RBI has evolved from a traditional regulator of currency and credit into a modern central bank responsible for monetary policy, financial stability, banking regulation, foreign exchange management, and economic development.

During the early decades after independence, India followed a regime of extensive state intervention and planned economic development. Monetary policy mainly relied on direct instruments such as administered interest rates, credit ceilings, and selective credit controls. The RBI's role extended beyond traditional central banking to include developmental and promotional functions aimed at supporting economic planning and industrialisation.

A major turning point came with the Committee to Review the Working of the Monetary System, chaired by Prof. Sukhamoy Chakravarty, which was constituted in 1982 and submitted its report in 1985. The committee recommended a framework of "Monetary Targeting with Feedback", under which growth in money supply should be regulated in accordance with expected real GDP growth and an acceptable level of inflation. It further recommended that monetary policy in India should aim at achieving price stability, economic growth, equity, and social justice, along with promoting and nurturing new

monetary and financial institutions. The committee also emphasised disciplined monetary expansion, improved coordination between fiscal and monetary policy, and greater reliance on indirect monetary instruments such as interest rates.

Based on the above recommendations, the RBI adopted the Monetary Targeting Framework during 1985–1998. Subsequently, the RBI shifted to the Multiple Indicator Approach in 1998 and later adopted the Flexible Inflation Targeting (FIT) framework in 2016. These reforms marked a gradual transition from direct monetary controls to market-oriented monetary management and strengthened the institutional framework of monetary policy in India. This evolution ultimately culminated in the establishment of the MPC under the amended RBI Act in 2016.

Before the establishment of the MPC, the responsibility for formulating monetary policy in India rested primarily with the Governor of the RBI. Although consultations were held with experts, financial institutions, and government authorities, the final decision regarding policy rates and monetary policy measures was vested in the RBI Governor.

A major institutional reform in India's monetary policy framework took place following the recommendations of the Expert Committee to Revise and Strengthen the Monetary Policy Framework, chaired by Dr. Urjit Ravindra Patel. The committee, constituted during the tenure of Dr. Raghuram Rajan as Governor of the RBI, reflected his reform-oriented approach towards making monetary policy more transparent, accountable, rule-based, and inflation-focused.

At the time of the constitution of the committee, Dr. Urjit Ravindra Patel was serving as the Deputy Governor of the RBI. The committee examined the existing monetary policy framework in India and recommended significant structural reforms in the conduct of monetary policy.

The Patel Committee recommended the adoption of a Flexible Inflation Targeting (FIT) framework and emphasised the need for a committee-based approach to monetary policy decision-making instead of concentrating such powers solely in the hands of the RBI Governor. The committee recommended that inflation should be measured on the basis of the Consumer Price Index (CPI Combined), which captures headline inflation more effectively than the Wholesale Price Index (WPI), previously used as the principal inflation indicator in India.

The committee further recommended the establishment of a five-member Monetary Policy Committee, including two external experts, in order to ensure professionalism, transparency, accountability, and collective decision-making in monetary policy formulation. The committee-based framework was intended to enhance policy credibility, improve monetary transmission, and anchor inflation expectations in the economy.

The Patel Committee also recommended an inflation target of 4 per cent with a tolerance band of +/- 2 percentage points. It proposed that the inflation targeting framework should initially remain applicable for a period of five years from 5 August 2016 to 31 March 2021.

However, while implementing the recommendations of the Patel Committee, the Central Government introduced certain modifications to the proposed structure of the MPC. The number of external members was increased from two to three, and their tenure was from three years to four years. The power to appoint the external members was vested in the Central Government on the recommendation of a Search-cum-Selection Committee headed by the Cabinet Secretary, of which the RBI Governor isalso a member.

Some economists and policy analysts have argued that the Government may consider revisiting certain aspects of the original recommendations of the Patel Committee in order to further strengthen the institutional role of the RBI in monetary policy formulation. The Patel Committee had originally proposed a five-member Monetary Policy Committee consisting of three RBI representatives and two external experts.

However, while implementing the recommendations, the Government increased the number of external members to three and vested their appointment in the Central Government. Although the present framework has substantially improved transparency, accountability and collective decision-making, it has been argued that a relatively stronger institutional role for the RBI would further enhance central bank independence, policy credibility and the effectiveness of monetary policy. Greater operational autonomy of the RBI may help in better anchoring inflation expectations, improving monetary policy transmission, strengthening investor confidence and safeguarding long-term macroeconomic and financial stability. Accordingly, the Government may consider implementing the broader institutional vision underlying the Patel Committee's recommendations so as to further strengthen the RBI's role in the conduct of monetary policy while preserving the accountability and transparency of the existing framework.

These modifications gave rise to discussions regarding the extent of governmental influence in monetary policy formulation and the autonomy of the RBI. It may be argued that increasing the number of government-appointed external members could enhance governmental influence over monetary policy decisions. Nevertheless, the establishment of the MPC marked a significant step towards institutionalising a transparent, accountable, rule-based, and modern monetary policy framework in India.

In May 2016, the RBI Act, 1934, was amended to provide a statutory basis for the implementation of the Flexible Inflation Targeting framework and the constitution of the Monetary Policy Committee. Under the amended provisions of the RBI Act, the inflation target is to be determined by the Central Government in consultation with the RBI. Ac-

cordingly, the inflation target was officially fixed at 4 per cent with a tolerance band of+/- 2 per cent for the period from 5 August 2016 to 31 March 2021. After the completion of the first five-year period, the Government retained the same inflation target and tolerance band for the period from 1 April 2021 to 31 March 2026. Subsequently, the Government again retained the same inflation target and tolerance band of 4 per cent with a tolerance band of +/- 2 per cent for the period from 1 April 2026 to 31 March 2031.

The Monetary Policy Committee was formally constituted under Section 45ZB of the RBI Act, 1934, as amended by the Finance Act, 2016. The MPC was constituted on 29 September 2016 and held its first meeting on 3–4 October 2016.

The MPC consists of six members:

1. The Governor of the RBI — Chairperson, ex officio;
2. The Deputy Governor of the RBI in charge of Monetary Policy — Member, ex officio;
3. One officer of the RBI nominated by the Central Board — Member, ex officio; and
4. Three external members appointed by the Central Government.

Each member of the MPC has one vote, and in the event of a tie, the RBI Governor has a casting vote. The MPC determines the policy repo rate required to achieve the inflation target under the Flexible Inflation Targeting framework. The establishment of the MPC represented a decisive shift from discretionary and individual-centric monetary policy towards an institutionalised, transparent, accountable, and rule-based framework of monetary governance in India.

Differences of Opinion between the RBI and the Government:

Since the establishment of the RBI, differences of opinion have occasionally arisen between the RBI and the Government regarding monetary and fiscal policies. Such differences are not unique to India; similar debates regarding central bank autonomy and government influence are witnessed in several countries across the world.

One of the earliest instances highlighting issues related to central bank independence in India occurred during the tenure of Sir Osborne Arkell Smith, the first Governor of the RBI during the pre-independence period. He was appointed in April 1935. In October1936, Smith resigned from the RBI before completing his prescribed tenure of three and a half years, serving only about 18 months as Governor. However, his resignation became effective from 1 July 1937, as he was granted eight months of leave.

Sir Osborne Smith differed with Sir James Grigg, the then Financial Member of the Government of India under British rule, on issues related to the Bank Rate Policy and the

proposal to reduce the exchange value of the rupee to counter deflationary conditions. These disagreements eventually led to Smith's resignation before the completion of his tenure. The incident highlighted the importance of the central bank's independence even in the early years following the establishment of the RBI.

After the independence of the country, Sir Benegal Rama Rau, the fourth Governor of the RBI, resigned on 14 January 1957 before the completion of his tenure due to differences with T. T. Krishnamachari, the then Finance Minister of India, regarding the RBI. This episode highlighted tensions between the Government and the RBI regarding policy autonomy and administrative functioning, and is regarded as an important episode in the evaluation of central bank autonomy in India.

Both Shri K. R. Puri, the twelfth Governor of the RBI, and Shri R. N. Malhotra, the seventeenth Governor of the RBI, stepped down on 2 May 1977 and 22 December1990, respectively, following changes in the Government at the Centre. These instances also reflected the close relationship between political changes and the functioning of the central bank.

In the post-independence period, the Government and the RBI have often differed in their approach towards economic management. Generally, the Government tends to prefer lower interest rates and expansionary monetary policies in order to stimulate economic growth, investment, employment, and borrowing. On the other hand, the RBI primarily focuses on controlling inflation, maintaining price stability, ensuring financial stability, and safeguarding the long-term stability of the economy.

Thus, the debate often reflects the broader issue of "growth versus inflation control" and "autonomy versus accountability" of the central bank. Excessive governmental interference in monetary policy may weaken investor confidence, adversely affect financial markets, and reduce the credibility and independence of the RBI.

The issue of RBI autonomy again came into public discussion during the tenure of Dr. Urjit Patel, the 24th Governor of the RBI, who resigned before the completion of his term in December 2018. During this period, discussions also emerged regarding the possible use of Section 7 of the RBI Act, 1934, under which the Central Government has the power to issue directions to the RBI in public interest after consultation with the Governor.

Similarly, former RBI Deputy Governor Dr. Viral Acharya publicly emphasised the importance of preserving the independence and credibility of the central bank. He warned that weakening the autonomy of the central bank would adversely affect market confidence and macroeconomic stability.

These developments demonstrated the need for a transparent, accountable, and institutionalised monetary policy framework. Consequently, the MPC was established in2016

to ensure collective decision-making, greater transparency, accountability, and rule-based monetary policy formulation in India.

Objectives of Monetary Policy:

Monetary policy refers to the measures formulated and implemented by a central bank to regulate money supply, credit availability, interest rates, liquidity, and overall financial conditions in an economy. In India, the RBI conducts monetary policy.

The primary objective of monetary policy is to maintain economic stability while promoting sustainable growth. In India, these objectives have evolved in response to changing economic conditions and developmental needs.

The major objectives of monetary policy are discussed below:

(i) Price Stability:

Price stability is the foremost objective of monetary policy. Stable prices reduce uncertainty, protect purchasing power, encourage savings and investment, and create a favourable environment for long-term economic growth. High inflation erodes purchasing power, creates uncertainty, and adversely affects economic development. The RBI regulates the money supply and interest rates to keep inflation within reasonable limits.

(ii) Economic Growth:

Monetary policy promotes sustainable economic growth by ensuring adequate and affordable credit for productive sectors such as agriculture, industry, trade, and services. By encouraging investment, production, and capital formation, monetary policy promotes higher output and employment generation.

(iii)Financial Stability:

The RBI monitors banks, financial institutions, and financial markets to prevent financial crises and maintain public confidence in the banking system. Financial stability is essential for the smooth functioning of the economy and long-term sustainable development.

(iv)Control of Credit and Money Supply:

The RBI regulates credit and money supply according to economic requirements. During inflationary periods, it reduces the money supply and tightens credit conditions, whereas during periods of recession, it adopts expansionary measures to stimulate economic activity.

(v) Liquidity Management:

Monetary policy also aims at maintaining adequate liquidity in the financial system to ensure the smooth functioning of financial markets, payment systems, and banking operations.

(vi) Exchange Rate Stability:

Monetary policy seeks to maintain stability in the value of the rupee and the exchange rate in order to promote international trade, foreign investment, and overall economic confidence.

(vii) Employment Generation:

By encouraging investment and economic expansion, monetary policy indirectly contributes to employment generation and the reduction of unemployment.

viii) Balanced Economic Development:

The RBI supports balanced regional and sectoral development by directing institutional credit towards priority sectors and economically underdeveloped regions of the country.

Monetary Policy Objectives in Major Economies:

Although the objectives of monetary policy differ across countries, most central banks focus on price stability, economic growth, employment generation, and financial stability.

The monetary policy objectives of the central banks of various major economies are discussed hereunder:

(i) United States:

The central bank of the United States, i.e., the Federal Reserve, follows a "dual mandate" of achieving maximum employment and stable prices. In addition, the Federal Reserve Act directs it to maintain moderate long-term interest rates, which supports sustainable economic growth.

(ii) United Kingdom:

The central bank of the United Kingdom, i.e., the Bank of England, primarily focuses on maintaining price stability through inflation targeting while also supporting the government's economic policy objectives of growth and employment.

(iii) European Union:

The central bank of the Eurozone, i.e., the European Central Bank, primarily aims at maintaining price stability in the Eurozone. Without prejudice to this objective, it also supports the general economic policies in the European Union.

(iv) Japan:

The central bank of Japan, i.e., the Bank of Japan, aims to achieve price stability and ensure the stability of the financial system, thereby contributing to the sound development of the national economy.

(v) China:

The central bank of China, i.e., the People's Bank of China, has the primary objective of maintaining the stability of the value of the currency, thereby promoting economic growth and safeguarding financial stability. China's monetary policy also supports broader economic development and macroeconomic objectives.

Thus, although the institutional frameworks and policy priorities of central banks differ across countries, the broad objectives of monetary policy remain centered on price stability, economic growth, employment generation, and financial stability.

Types of Monetary Policy:

Monetary policy refers to the policy formulated and implemented by the central bank ofa country to regulate money supply, credit availability, interest rates, and overall economic activity within the economy. Monetary policy may be broadly classified into three types, namely Expansionary Monetary Policy, Contractionary Monetary Policy, and Neutral Monetary Policy. Depending on the prevailing economic conditions and policy objectives, the central bank adopts an appropriate type of monetary policy. The three types of monetary policy are discussed hereunder:

(i) Expansionary Monetary Policy:

Expansionary monetary policy, also known as easy or accommodative monetary policy, is adopted during periods of economic slowdown or recession to increase the money supply and stimulate economic activity.

Under this policy, the central bank reduces interest rates, lowers reserve requirements, and purchases government securities through open market operations. These measures augment liquidity within the economy and encourage borrowing, investment, production, employment generation, and aggregate demand.

The major objectives of expansionary monetary policy are to promote economic growth, increase investment and consumption, reduce unemployment, and improve liquidity in the financial system. However, excessive expansionary monetary policy may result in inflationary pressures within the economy. In MPC communication, this corresponds to an "accommodative stance."

(ii) Contractionary Monetary Policy:

Contractionary monetary policy, also known as tight or restrictive monetary policy, is adopted to control inflation and reduce excess money supply within the economy.

Under this policy, the central bank increases interest rates, raises reserve requirements, and sells government securities through open market operations. These measures reduce liquidity within the economy and discourage excessive borrowing and spending.

The main objectives of contractionary monetary policy are to control inflation, maintain price stability, reduce excess demand, and ensure financial stability. However, such a policy may slow down economic growth and reduce employment opportunities in the short run. In MPC communication, this corresponds to a "withdrawal of accommodation" or a "hawkish stance."

(iii) Neutral Monetary Policy:

Neutral monetary policy, also called a neutral stance, is adopted when the central bank seeks to maintain a balance between economic growth and price stability without significantly increasing or decreasing the money supply.

Under this policy, the central bank keeps interest rates relatively stable and maintains moderate liquidity conditions within the economy. Neutral monetary policy is generally followed when the economy experiences stable economic growth with moderate inflation. The MPC refers to this as a "neutral stance", indicating that policy rates may move in either direction depending on evolving macroeconomic conditions and in coming data.

Thus, the type of monetary policy adopted by a central bank depends on the prevailing economic conditions and the broader objectives of economic growth, price stability, employment generation, and financial stability.

Tools of Monetary Policy and Various Variants of Repo Operations:

Monetary policy refers to the policy formulated and implemented by the central bank to regulate money supply, credit conditions, liquidity, interest rates, and overall economic activity within the economy. In India, monetary policy is conducted by the RBI with the primary objective of maintaining price stability while keeping in mind the objective of growth, within the inflation target set by the Government of India in consultation with the RBI under Section 45ZA of the RBI Act, 1934.

The RBI uses both quantitative and qualitative instruments of monetary policy. Quantitative instruments influence the overall volume of money and credit in the economy through changes in reserve ratios, interest rates, and open market operations. These instruments affect the cost and availability of credit across all sectors without discrimination. Qualitative instruments, on the other hand, influence the direction and allocation of credit to specific sectors or activities through measures such as margin requirements, credit rationing, and moral suasion.

Quantitative Instruments:

The quantitative instruments of monetary policy used by the RBI are discussed below

1. Liquidity Adjustment Facility:

The Liquidity Adjustment Facility (LAF) is the RBI's framework for managing short-term liquidity and guiding money market interest rates in the economy. Through the LAF, the RBI injects liquidity into the banking system or absorbs liquidity from the banking system.

The LAF operates through an interest-rate corridor in which the policy repo rate, decided by the Monetary Policy Committee (MPC), forms the central rate. The Standing Deposit Facility (SDF) rate acts as the lower bound or floor of the corridor and is 25 basis points below the policy repo rate, while the Marginal Standing Facility (MSF) rate acts as the upper bound or ceiling and is 25 basis points above the policy repo rate. The Bank Rate is aligned with the MSF rate.

The core LAF framework comprises repo operations, reverse repo operations, the Standing Deposit Facility (SDF), and the Marginal Standing Facility (MSF). Repo operations include overnight repo, term repo, fixed-rate repo, and variable-rate repo operations. Reverse repo operations include fixed-rate reverse repo operations, where conducted by the RBI, and Variable Rate Reverse Repo (VRRR) auctions.

In addition to the core LAF operations, the RBI has introduced specialised repo-based liquidity facilities such as Long-Term Repo Operations (LTROs), Targeted Long-Term Repo Operations (TLTROs), and TLTRO 2.0 to provide durable liquidity and support specific sectors during periods of financial stress and economic disruption. Although these facilities are repo-based liquidity operations and form part of the RBI's broader liquidity management framework, they are generally discussed separately because of their longer maturities and specific policy objectives.

The LAF helps the RBI to manage liquidity mismatches, stabilise short-term interest rates, improve monetary policy transmission, and maintain orderly financial market conditions. Thus, it serves as the operational backbone of the RBI's monetary policy framework.

While the LAF constitutes the principal framework for short-term liquidity management, all quantitative instruments of monetary policy are not parts of the LAF. The RBI also employs several other quantitative instruments, including the Cash Reserve Ratio (CRR), Statutory Liquidity Ratio (SLR), Open Market Operations (OMO), and Bank Rate, to regulate liquidity, credit availability, interest rates, and money supply in the economy.

Accordingly, the major components of the LAF and related liquidity management operations discussed below include Repo Rate, Overnight Repo, Term Repo, Fixed Rate Repo, Variable Rate Repo, Long-Term Repo Operations (LTROs), Targeted Long-Term Repo Operations (TLTROs), TLTRO 2.0, Reverse Repo Rate, Variable Rate Reverse Repo (VRRR), Marginal Standing Facility (MSF), and Standing Deposit Facility (SDF). Other quantitative instruments such as CRR, SLR, OMO, and Bank Rate are discussed separately.

(a) Repo Rate:

The repo rate is the rate at which the RBI lends funds to banks against the collateral of government and other approved securities under the LAF.

A reduction in the repo rate makes borrowing cheaper for banks and can increase liquidity and credit flow within the economy. Conversely, an increase in the repo rate raises borrowing costs, discourages excessive credit expansion, and helps to control inflationary pressures. The policy repo rate is decided by the MPC.

Variants of Repo Operations:

(i) Overnight Repo: Overnight repo refers to borrowing by banks from the RBI for one day against eligible collateral securities. It is mainly used to manage very short-term liquidity mismatches.

(ii) Term Repo: Term repo operations provide liquidity to banks for periods longer than overnight, such as 7 days, 14 days, or 28 days, as decided by the RBI.

(iii) Fixed Rate Repo: Under fixed rate repo operations, the RBI provides funds at a pre-announced fixed interest rate.

(iv) Variable Rate Repo: Under variable rate repo operations, liquidity is provided through auction-based mechanisms of the RBI under which participating banks bid competitively for funds. The interest rate is determined through market-based bidding.

(v) Long-Term Repo Operations (LTROs): Long-Term Repo Operations of the RBI provide funds to banks for periods ranging from one year to three years at the prevailing policy repo rate. LTROs are used to provide durable liquidity to the banking system, particularly during periods of financial stress or tight liquidity conditions.

(vi)Targeted Long-Term Repo Operations (TLTROs): Under TLTROs, banks are required to invest borrowed funds in specified sectors and instruments identified by the RBI, such as corporate bonds, NBFCs, MFIs, and other stressed sectors. TLTROs are special repo operations conducted by the RBI. The objective of TLTROs is to reduce financial stress in such sectors by improving liquidity and credit flow.

Banks are required to deploy funds within the period specified by the RBI. If banks fail to deploy funds within the stipulated period fixed by the RBI, they are required to pay penal interest to the RBI at the policy repo rate plus 200 basis points for the period of non-deployment.

Moreover, banks are required to invest in eligible securities over and above their existing holdings and maintain such investments in the Held-to-Maturity (HTM) category until maturity. This requirement ensures that the value of eligible securities does not fall below the amount borrowed under the TLTRO scheme.

(vii) TLTRO 2.0: TLTRO 2.0 was introduced during the COVID-19 pandemic to improve liquidity conditions for small and medium-sized NBFCs, MFIs, and other stressed financial entities.

Under TLTRO 2.0, funds were provided for periods ranging from one year to three years at the prevailing repo rate. Banks were required to deploy at least 50 per cent of borrowed funds in small and mid-sized NBFCs and MFIs. The deployment period for these funds was extended to 45 working days, and non-deployment within the stipulated period attracted penal interest at the repo rate plus 200 basis points. Investments under the scheme were permitted in investment-grade bonds and commercial papers (CPs).The primary objective of TLTRO 2.0 was to improve credit flow to financial entities facing liquidity constraints.

An important limitation associated with repo operations is that commercial banks must possess sufficient excess Statutory Liquidity Ratio (SLR) securities to access repo liquidity facilities. In the absence of adequate eligible securities, banks may have to depend upon alternative short-term liquidity sources such as the call money market or the Treasury Bills Repurchase (TREP) market for meeting their liquidity requirements.

(b) Reverse Repo Rate:

The reverse repo rate refers to the rate of interest at which the RBI absorbs liquidity from commercial banks through reverse repo transactions under the Liquidity Adjustment Facility (LAF). In a reverse repo transaction, commercial banks place surplus funds with the RBI, and the RBI provides government securities and other approved securities under an agreement to repurchase them at a predetermined date and price.

Traditionally, the reverse repo rate served as an important liquidity absorption instrument of the RBI. An increase in the reverse repo rate encourages banks to park surplus funds with the RBI, thereby reducing liquidity available for lending in the economy. Conversely, a reduction in the reverse repo rate discourages banks from depositing funds with the RBI and may encourage greater credit expansion.

Prior to April 2022, the fixed-rate reverse repo rate constituted the lower bound, or floor, of the Liquidity Adjustment Facility corridor. However, with the introduction of the Standing Deposit Facility (SDF) on 8 April 2022, the SDF rate replaced the fixed-rate reverse repo rate as the floor of the LAF corridor. Consequently, the SDF has become the principal facility for collateral-free absorption of surplus liquidity from the banking system.

Nevertheless, reverse repo operations continue to remain part of the RBI's liquidity management toolkit. The RBI may conduct fixed-rate or variable-rate reverse repo operations, including Variable Rate Reverse Repo (VRRR) auctions, whenever considered necessary for liquidity management and monetary policy transmission.

(c)The Variable Rate Reverse Repo (VRRR):

The VRRR is classified as a variant of reverse repo operations. It is an auction-based liquidity absorption tool under the LAF. Commercial banks bid competitively to park surplus funds with the RBI for maturities ranging from overnight up to 14 days, with the7-day tenor serving as the primary operation. Unlike the fixed-rate Standing Deposit Facility (SDF), which acts as a continuous overnight floor, VRRR dynamically discovers rates through market bidding to fine-tune larger liquidity pools. Ultimately, the RBI uses VRRR to drain excess systemic cash and improve monetary transmission by aligning short-term market rates with the policy repo rate.

(d) Marginal Standing Facility (MSF):

Marginal Standing Facility (MSF) is the facility under which banks can borrow overnight funds from the RBI by dipping into their SLR portfolio up to a predefined limit of 2 per cent of NDTL. This facility acts as a safety valve against unanticipated liquidity shocks in the banking system. The MSF rate is fixed at 25 basis points above the policy repo rate. Under the MSF, eligible banks have the option to borrow up to 2 per cent of their respective Net Demand and Time Liabilities (NDTL) outstanding at the end of the second preceding fortnight. Banks may also continue to access overnight funds under this facility against their excess SLR holdings.

In the event of a bank's SLR holdings falling below the statutory requirement by up to 2per cent of its NDTL due to the use of this facility, the bank shall not have the obligation to seek a separate waiver for the resulting shortfall in SLR maintenance.

Within the mandatory SLR requirement, government securities utilised under the MSF are permitted to be reckoned as Level 1 High Quality Liquid Assets (HQLAs) for the purpose of computing the Liquidity Coverage Ratio (LCR) of banks. In addition, banks are permitted to reckon such percentage of their NDTL maintained under the mandatory SLR requirement as Level 1 HQLA, as prescribed by the RBI from time to time. This facility

enables banks to maintain adequate liquidity and comply with LCR requirements. The computation of the Liquidity Coverage Ratio (LCR) is influenced by the run-off factor, which represents the estimated proportion of deposits that a bank expects to be withdrawn or transferred during a period of liquidity stress. Under the Basel III framework adopted by the RBI, stable retail deposits are assigned relatively low run-off factors. For example, retail deposits without internet and mobile banking facilities attract a run-off factor of 5 per cent. This implies that, for every Rs. 100 mobilised as such deposits, banks are required to maintain Rs. 5 in the form of HQLAs for LCR purposes.

In contrast, deposits mobilised from banks, insurance companies, financial institutions and entities engaged in the business of financial services are assigned a run-off factor of 100 per cent. Consequently, banks are required to maintain HQLAs equivalent to the entire amount of such deposits for LCR purposes, thereby increasing liquidity requirements and reducing the proportion of funds available for deployment in higher-yielding assets and loans.

Illustratively, after accounting for statutory pre-emptions such as the CRR and the SLR, currently prescribed at 3 per cent and 18 per cent respectively of NDTL, together with the HQLA requirement arising from a 5 per cent run-off factor, approximately Rs. 74 out of every Rs. 100 of such retail deposits may remain available for lending and investment activities. For institutional deposits, however, the combined effect of a 100 per cent run-off factor and statutory pre-emption substantially increases the liquidity resources that banks are required to maintain.

In recent years, a structural shift in deposit composition has been observed, whereby savers, in pursuit of higher returns, are increasingly allocating funds to mutual funds and other market-based investment avenues. These funds, in turn, often place deposits with banks as institutional deposits. This phenomenon, sometimes described as the "wholesaleisation" of deposits, increases the proportion of bank liabilities subject to higher run-off factors under the LCR framework. As a result, banks are required to maintain larger stocks of HQLAs, which may reduce the availability of funds for credit intermediation.

As of March 2026, scheduled commercial banks in India maintained robust liquidity buffers, with aggregate LCR levels significantly above the regulatory minimum requirement of 100 per cent. Nevertheless, sections of the banking industry have represented to the RBI that the run-off assumptions applicable to certain categories of institutional deposits warrant recalibration in light of evolving deposit dynamics. It has also been argued that a calibrated reduction in liquidity-related regulatory requirements, including CRR, SLR or selected run-off factors, could release additional lendable resources while preserving financial stability. Proponents of this view contend that such measures would enable banks to channel a greater proportion of their liabilities towards productive lend-

ing and investment, thereby supporting economic growth.

(e) Standing Deposit Facility (SDF):

The SDF, introduced on 8 April 2022, is a collateral-free liquidity absorption facility under which banks can deposit surplus funds with the RBI without receiving government securities as collateral.

The SDF rate acts as the lower bound of the LAF corridor and is 25 basis points below the policy repo rate, replacing the fixed-rate reverse repo rate as the floor of the LAF corridor.

Prior to the introduction of the SDF, the fixed-rate reverse repo rate functioned as the lower bound of the LAF corridor and was used by the RBI to absorb surplus liquidity from the banking system through collateralised reverse repo operations. The introduction of the SDF strengthened the RBI's liquidity management framework by enabling collateral-free absorption of surplus liquidity.

(2)Cash Reserve Ratio (CRR):

As per Section 42(1) of the RBI Act, 1934, CRR is the percentage of a bank's Net Demand and Time Liabilities (NDTL) that must be maintained by commercial banks with the RBI. Previously, interest was paid on CRR balances. However, the payment of interest to banks on their CRR balances maintained with the RBI was discontinued with effect from the fortnight beginning 31 March 2007. This change was introduced through the RBI (Amendment) Act, 2006, whereby sub-section (1B) of Section 42 was amended.

An increase in the CRR reduces the lendable resources of banks and contracts liquidity within the economy. Conversely, a reduction in CRR increases the lending capacity of banks and enhances liquidity.

Although the RBI is empowered to pay interest under the RBI Act, currently, no interest is paid on CRR balances maintained by scheduled commercial banks. The CRR is prescribed by the RBI under Section 42(1) of the Reserve Bank of India Act, 1934, and is not determined by the MPC.

(3)Statutory Liquidity Ratio (SLR):

As per Section 24 of the Banking Regulation Act, 1949, the SLR refers to the percentage of a bank's NDTL that is to be maintained in the form of liquid assets such as cash, gold, government securities, and other approved securities. The maintenance of SLR helps to ensure the liquidity and solvency of banks and also functions as a tool to control credit flow in the economy. For reducing the lendable resources of banks, the RBI increases the SLR, but for increasing the lendable resources, the RBI reduces the SLR.

(4) Open Market Operations (OMO):

Open Market Operations refer to the outright purchase and sale of government securities by the RBI in the open market. When the RBI purchases securities, liquidity is injected into the banking system. Conversely, when the RBI sells securities, liquidity is absorbed from the banking system. OMOs serve as an essential instrument for managing durable, long-term systemic liquidity conditions and influencing the overall money supply within the economy.

(5)Bank Rate:

Bank Rate refers to the rate at which the central bank of a country provides loans and financial assistance to commercial banks. In India, the RBI determines the Bank Rate. It is also known as the discount rate because the central bank provides refinance facilities to commercial banks by rediscounting bills of exchange.

The Bank Rate is an important instrument of monetary policy used to regulate credit and money supply in the economy. By increasing the Bank Rate, the central bank makes borrowing more expensive for commercial banks, which reduces their ability to create credit. Conversely, a decrease in the Bank Rate encourages commercial banks to borrow more and expand credit facilities. However, the repo rate has now emerged as the primary policy rate, reducing the significance of the Bank Rate. Nevertheless, changes in the Bank Rate continue to serve as an important signal regarding the direction of interest rates and monetary policy in the economy.

Qualitative Instruments of Monetary Policy:

(1) Margin Requirement:

Margin requirement refers to the minimum proportion of the value of a security or commodity that the borrower must finance from their own funds, while the remaining portion may be financed through bank credit.

For example, if the value of a commodity is Rs. 1,000 and the prescribed margin requirement is 25 per cent, the bank can grant a loan up to Rs. 750, while the borrower must contribute the remaining Rs. 250 from his own funds.

By increasing margin requirements, the RBI reduces the amount of credit available in the banking sector. On the other hand, by reducing margin requirements, the RBI can increase the amount of credit in the banking sector.

Margin requirements are used as a selective credit control measure to regulate credit flow towards sensitive commodities and specific activities.

(2) Credit Rationing:

Credit rationing refers to restrictions imposed on the amount of credit that banks may extend to particular sectors or borrowers. It helps to ensure proper allocation of financial resources and prevents excessive concentration of credit in the speculative sector.

(3) Moral Suasion:

Moral suasion refers to persuasive measures adopted by the RBI to influence the lending and investment behaviour of banks through meetings, policy guidance, appeals, and discussions. Under this method, the RBI relies on persuasion and cooperation rather than legal compulsion.

(4) Direct Action:

Direct action refers to regulatory or punitive measures taken by the RBI against banks that fail to comply with banking regulations or monetary policy directives. Such measures may include imposition of penalties, refusal of refinance facilities, or other supervisory actions.

(5) Selective Credit Control:

Selective credit control refers to restrictions imposed on bank credit relating to specific commodities or sectors to prevent hoarding, speculative activities, and inflationary pressures.

From the above discussion about the quantitative and qualitative measures, the following conclusions may be drawn.

The RBI employs a comprehensive framework of quantitative and qualitative monetary policy instruments to regulate liquidity, influence interest rates, control inflation, support economic growth, and maintain financial stability.

Within this framework, the Liquidity Adjustment Facility (LAF) plays a central role in short-term liquidity management and effective monetary policy transmission. Repo and variable rate repo operations primarily inject liquidity into the banking system, while reverse repo operations, including variable rate reverse repo auctions and the Standing Deposit Facility, help to absorb surplus liquidity.

The introduction and evolution of instruments such as Long-Term Repo Operations, TLTRO, variable rate reverse repo auctions, and the SDF demonstrate the increasing sophistication of India's liquidity management framework and reflect the RBI's adaptive response to evolving macroeconomic and financial conditions.

Along with instruments such as the CRR, SLR, OMOs, Bank Rate, MSF, and selec-

tive credit control measures, these tools enable the RBI to maintain macroeconomic stability, manage liquidity effectively, and ensure the smooth functioning of India's financial system.

Monetary Policy Transmission Mechanism: Evolution from BPLR to MCLR andEBLR

Another important dimension of the evolution of India's monetary policy framework has been the strengthening of the monetary policy transmission mechanism. The effectiveness of monetary policy depends not only upon the formulation of appropriate policy measures but also upon the speed and extent to which changes in policy rates are transmitted to lending rates, deposit rates and broader financial market conditions, thereby influencing investment, consumption, output and inflation.

Historically, commercial banks in India determined their lending rates under various internal benchmark systems such as the Benchmark Prime Lending Rate (BPLR) and the Base Rate system. However, these frameworks were frequently criticised for inadequate and delayed transmission of changes in the RBI's policy rates to borrowers.

In order to improve monetary policy transmission, the Reserve Bank of India introduced the Marginal Cost of Funds Based Lending Rate (MCLR) framework with effect from 1April 2016, replacing the Base Rate system. Under the MCLR framework, banks were required to determine their lending rates primarily on the basis of the marginal cost of funds, negative carry on account of CRR, operating costs and tenor premium. The objective of MCLR was to ensure that changes in the policy repo rate were reflected more quickly in lending rates and thereby improve the effectiveness of monetary policy transmission.

Nevertheless, concerns continued regarding incomplete and delayed transmission of policy rate changes. Since MCLR remained an internally determined benchmark, banks retained considerable discretion in determining lending rates. Consequently, reductions in policy rates were often not passed on fully or promptly to borrowers.

In order to further strengthen monetary policy transmission, the RBI constituted an Internal Study Group under the chairmanship of Shri Janak Raj to examine the existing loan pricing framework. The Study Group submitted its report in October 2017 and recommended that banks should gradually move away from internally determined benchmark lending rates such as MCLR and link lending rates to external benchmark rates such as the RBI policy repo rate, Treasury Bill rates and Certificate of Deposit (CD) rates.

After obtaining feedback from stakeholders and the general public, the RBI introduced the External Benchmark-Based Lending Rate (EBLR) framework. Accordingly, with effect from 1 October 2019, all scheduled commercial banks were required to link all new

floating-rate personal or retail loans, including housing loans, vehicle loans and other retail loans, and floating-rate loans extended to Micro and Small Enterprises, to any one of the following external benchmarks. Subsequently, with effect from 1 April 2020, loans to Medium Enterprises were also linked to external benchmarks:

(i) the RBI policy repo rate;

(ii) the Government of India 3-month Treasury Bill yield published by the Financial Benchmarks India Private Limited (FBIL);

(iii) the Government of India 6-month Treasury Bill yield published by FBIL; or

(iv) any other benchmark market interest rate published by FBIL.

Under the EBLR framework, lending rates are determined by adding an appropriate spread to the chosen benchmark. As the benchmark changes automatically in response to policy actions of the RBI or market developments, lending rates also adjust more rapidly, thereby strengthening monetary policy transmission.

The introduction of EBLR represented a significant reform in India's monetary policy framework. It enhanced transparency in loan pricing, reduced the discretion available to banks in determining lending rates and improved the transmission of monetary policy decisions to borrowers. At the same time, the shift from MCLR to externally benchmarked lending rates reduced the flexibility available to banks in pricing loans according to their individual cost structures and funding patterns. Under the MCLR framework, lending rates reflected the marginal cost of funds of individual banks and therefore took into account variations in deposit costs, operating expenses and funding structures. Lending rates should primarily reflect the actual cost of deposits and overall cost of funds of individual banks, together with appropriate risk considerations, rather than being linked predominantly to external benchmark rates.

An important issue arising from the transition from MCLR to the EBLR framework is the differential treatment of borrowers. While many large corporate borrowers continue to avail themselves of credit facilities linked to MCLR or other negotiated benchmark rates, floating-rate retail and MSME borrowers are generally subject to the EBLR framework.

Consequently, increases in the policy repo rate are transmitted more rapidly to retail and MSME borrowers than to many large corporate borrowers. This results in a situation where smaller borrowers often bear the burden of higher interest costs more quickly than large borrowers.

The transition from the MCLR framework to the EBLR framework has created particular challenges for Micro, Small and Medium Enterprises (MSMEs). Under the EBLR framework, floating-rate loans extended to MSMEs are directly linked to changes in the

RBI's policy repo rate and other external benchmarks. Consequently, increases in policy rates are transmitted rapidly and almost automatically to MSME borrowers, leading to a quicker increase in borrowing costs during periods of monetary tightening.

In contrast, many large corporate borrowers continue to enjoy lending arrangements where the transmission of policy rate increases is relatively slower. As a result, large borrowers may effectively pay lower interest rates for a longer period, whereas MSMEs experience a more immediate increase in borrowing costs. Such asymmetry in monetary policy transmission may adversely affect smaller enterprises that possess limited bargaining power, restricted access to alternative sources of finance and greater sensitivity to interest-rate fluctuations.

This issue assumes particular significance because the MSME sector constitutes one of the most important pillars of the Indian economy, contributing approximately 31.1 per cent of India's Gross Domestic Product and about 48.58 per cent of the country's exports. The sector also plays a crucial role in employment generation, entrepreneurship, regional development and industrial diversification. A monetary transmission framework that results in disproportionately rapid increases in borrowing costs for MSMEs may adversely affects investment, production, employment generation and export competitiveness and may thereby impede broader economic development.

Monetary policy decisions should take into account not only the asset side but also the liability side of the banking system's balance sheet. Significant changes in interest rates influence deposit mobilisation, financial savings, capital flows, exchange rate dynamics and external sector stability. From this perspective, a comprehensive assessment of monetary policy transmission should consider its implications for banking sector liabilities, financial savings, foreign capital movements and foreign exchange reserves, in addition to its effects on inflation, economic growth and credit expansion. However, the extent of such effects remains a matter of continuing debate among economists, bankers, and policymakers.

The evolution from BPLR to Base Rate, from Base Rate to MCLR, and subsequently from MCLR to the EBLR framework illustrates the RBI's continuing efforts to strengthen monetary policy transmission improve transparency in loan pricing and enhance the effectiveness of monetary policy in achieving the broader objectives of price stability, financial stability and sustainable economic growth. At the same time, the framework should ensure that monetary policy transmission remains balanced and equitable across different categories of borrowers, particularly MSMEs, which play a vital role in India's economic development, employment generation and export growth.

The Way Forward:

The Reserve Bank of India (RBI), established under the Reserve Bank of India Act, 1934, has evolved into a modern central bank responsible for maintaining price stability, regulating the banking system, managing currency and credit, ensuring financial stability, and supporting sustainable economic growth. Through its monetary policy framework, the RBI seeks to balance inflation control with economic development in an increasingly globalised economy.

The Indian economy has faced several domestic and global challenges, including financial market volatility, the COVID-19 pandemic, geopolitical conflicts, exchange rate instability, supply chain disruptions, and slowing global growth. In response, the RBI has adopted a flexible and adaptive monetary policy approach. The Flexible Inflation Targeting framework, with a CPI inflation target of 4 per cent +/- 2 per cent, along with the six-member Monetary Policy Committee, has strengthened transparency, accountability, and credibility in monetary policy formulation and implementation.

However, the Flexible Inflation Targeting framework and the functioning of the MPC have also attracted criticism. It has been argued that the MPC was, at times, slow to raise the repo rate during periods of rising inflation, which may have weakened inflation control and reduced consumer purchasing power. Critics further contend that excessive emphasis on economic growth may dilute the RBI's anti-inflationary stance. Moreover, supply-side inflation arising from food prices, fuel costs, and global disruptions cannot always be effectively controlled through monetary policy measures alone.

It is also often observed that when the Federal Reserve of the United States raises policy rates, the RBI adopts a tighter monetary policy stance to minimise capital outflows, depreciation of the rupee, and financial instability. Events such as the "Taper Tantrum" highlighted the vulnerability of emerging economies like India to changes in US monetary policy. However, when the Federal Reserve reduces policy rates, the RBI does not always immediately reduce the repo rate because inflationary conditions in India may differ from those in the United States.

The RBI has deployed advanced liquidity management instruments such as repo operations under the Liquidity Adjustment Facility, Long-Term Repo Operations, Targeted Long-Term Repo Operations, Marginal Standing Facility, and the Standing Deposit Facility. During the pandemic, the RBI adopted an accommodative stance and reduced the repo rate by 115 basis points to support economic recovery and maintain liquidity and credit flow.

Going forward, monetary policy transmission should be further strengthened so that changes in the policy repo rate are reflected more efficiently in lending rates, deposit

rates, and broader financial market conditions, with greater attention to reducing a symmetry between different categories of borrowers, including large corporate ,MSMEs ,and retail customers. Transmission to deposit rates should also be monitored carefully, as deposit mobilisation, household financial savings, and the liability structure of banks play an important role in sustaining credit growth and financial stability.

At the same time, efforts to improve monetary policy transmission should be accompanied by safeguards against unintended adverse effects on MSMEs. Given the sector's contribution of approximately 31.1 per cent of GDP and about 48.58 per cent of India's exports, a monetary transmission framework that results in disproportionately rapid increases in borrowing costs for MSMEs may adversely affect investment, production, employment and export competitiveness. Accordingly, the RBI and the MPC may consider mechanisms that ensure more balanced transmission of policy rate changes across different categories of borrowers while preserving the efficiency, transparency and credibility of the monetary policy framework.

An effective monetary policy framework must ensure not only economic growth but also price stability, equitable distribution of resources, reduction in unemployment, and financial stability. Therefore, the MPC should consider both the liability and asset sides of the banking industry's balance sheet while calibrating monetary policy tools, since interest rate changes affect deposit mobilisation, financial savings, capital flows, credit growth, and overall financial stability.

Central bank independence remains essential for credible monetary policy implementation. Episodes ranging from the tenure of Sir Osborne Arkell Smith to the resignation of Dr. Urjit Patel in 2018 highlight the importance of preserving RBI autonomy to maintain market confidence and macroeconomic stability.

Another area that merits consideration is the further strengthening of the institutional framework governing monetary policy. While the establishment of the Monetary Policy Committee represented a major reform in India's monetary policy architecture, the Government may consider implementing the broader institutional vision underlying the Patel Committee's recommendations so as to reinforce the RBI's role and operational autonomy in monetary policy management. A strong, credible and independent central bank is essential for maintaining price stability, ensuring effective monetary policy transmission, preserving financial stability and sustaining investor confidence. Strengthening the RBI's institutional capacity would therefore contribute not only to better inflation management but also to the long-term objective of sustainable and inclusive economic development.

In the future, strengthening monetary policy transmission, protecting MSMEs from disproportionate credit-cost shocks, promoting financial inclusion, supporting digital finance, managing climate-related financial risks and preserving financial stability will

remain major priorities. Simultaneously, consideration may be given to implementing the broader institutional vision underlying the Patel Committee's recommendations by further strengthening the RBI's autonomy and role in monetary policy management.

Thus, the RBI will continue to play a pivotal role in maintaining price stability, safeguarding financial stability, strengthening monetary policy credibility and transmission, supporting MSME-led growth and exports, and promoting sustainable long-term economic development in India.

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NBFCs in India: Growth and Stability— A Comprehensive Analysis of the NBFC Landscape Covering Growth Drivers, Digitization, Funding, Competition, Regulation, and the Road Ahead

Dr. Jafor Ali Akhan[1]

I. Introduction

Background to the Study

A Non-Banking Financial Company (NBFC) is a financial institution regulated by the Reserve Bank of India (RBI) that accepts deposits and provides credit but lacks a banking licence. NBFCs serve underserved segments with tailored products and deeper market understanding. As of September 2023, the NBFC sector had reached USD 326 billion in size, with 9,356 NBFCs registered with the RBI. With India's GDP projected at USD 7 trillion by 2030, NBFCs are expected to play a pivotal role in driving credit penetration, with credit growth expected at 13–14% in FY24.

Sectorata Glance

- NBFC sector size reached USD 326 billion as of 2023.
- As of September 2023, 9,356 NBFCs were registered with the RBI.
- India's GDP is projected at USD 7 trillion by 2030, creating vast credit opportunities.
- Credit growth is expected at 13–14% in FY24.

Scope of the Paper

This paper is structured around seven substantive chapters, each corresponding to a key dimension of the NBFC landscape as presented in the source report:

1. NBFC Landscape — Scale and Segmentation, including the Scale-Based Regulation (SBR) framework and key growth drivers.
2. Government Initiatives — OCEN, ONDC, and the Account Aggregator (AA) framework.

1. Principal, Surendranath Evening College

3. Digitisation across the NBFC value chain — front office, middle office, back office, analytics, and emerging lending models.
4. Green Finance and Liquidity Management — asset-side opportunities, funding avenues, and the regulatory liquidity framework.
5. Competition from Banks — market share pressures, technology and M&A dynamics, and NBFC competitive advantages.
6. Regulatory Landscape — SBR, Digital Lending Guidelines, Technology Risk Management, and DPDPA 2023.
7. Cyber Security, Business Continuity, Data Privacy, and Financial Performance.

II. NBFC Landscape — Scale and Segmentation

Scale-Based Regulation (SBR) Framework

Introduced in October 2022, the Scale-Based Regulation (SBR) framework represents a significant structural reform in NBFC oversight. The framework aligns regulatory intensity with systemic risk by applying differentiated prudential norms based on each NBFC's asset size and risk profile. It comprises four layers:

- Base Layer (BL): NBFCs with assets below INR 1,000 crore — subject to lighter-touch regulation.
- Middle Layer (ML): NBFCs with assets between INR 1,000 crore and INR 10,000 crore —
- subject to enhanced prudential norms.
- Upper Layer (UL): 16 systemically important NBFCs — subject to bank-like regulations including a Common Equity Tier-1 (CET-1) capital requirement of 9%.
- Top Layer (TL): Reserved for cases of extreme systemic risk.

The SBR framework incentivises consolidation among smaller players, raises compliance costs for larger institutions, and narrows the regulatory gap between banks and upper-layer NBFCs. Upper-layer NBFCs should anticipate increasingly bank-like requirements in governance, liquidity, asset quality, and digital lending.

Key Growth Drivers and Credit Trends

NBFC retail credit is projected to grow from INR 18 trillion (FY23E) to INR 23 trillion (FY25P), representing a compound annual growth rate (CAGR) of 13–15%. Housing and infrastructure dominate the portfolio, while MSME and microfinance shares are rising. Six key growth drivers underpin this expansion:

8. Deep Market Understanding: Last-mile delivery to unorganised, underserved segments with localised credit assessment.
9. Tailored Products: NBFCs offer customised pricing, tenors, and collateral requirements designed to meet the specific needs of diverse customer demographics.
10. Wider Reach: An omnichannel presence in Tier 2, Tier 3, and Tier 4 markets, supported by 24×7 digital and physical touchpoints, enables broad geographic penetration.
11. Technology and Fintech: Cloud infrastructure, GenAI-powered underwriting, and data lakes enable real-time credit decisions and operational efficiency at scale.
12. Co-Lending (RBI 2020): Collaborative lending between banks and NBFCs sharing credit risk and returns per agreed terms.
13. Government Initiatives: Policy support through PMMY (microfinance), UPI (digital payments), TReDS (trade receivables), ONDC (open commerce), GeM (procurement), GST (tax transparency), and the Account Aggregator framework (financial data sharing).

III. Government Initiatives

Open Credit Enablement Network (OCEN)

OCEN is an RBI-backed digital infrastructure designed to enable seamless credit flow from lenders — including banks and NBFCs — to borrowers through a network of Loan Service Providers (LSPs), aggregators, and fintech platforms.

Key Features

- Standardised APIs: Lenders and LSPs connect via common technical standards.
- Loan Service Providers (LSPs): Aggregators and fintechs originate loans on behalf of lenders.
- Instant Underwriting: Real-time credit decisions using alternative data.
- Digital Disbursement: Funds transferred directly to borrower accounts via UPI/NACH.
- Transparent Pricing: Standardised fee structures and interest rate disclosure.

Benefits for NBFCs

- Wider Distribution: Reach customers through multiple LSP channels.
- Lower Origination Costs: Leverage LSP infrastructure instead of building branches.

- Faster Underwriting: Automated credit assessment using alternative data.
- Reduced Default Risk: Better credit assessment through data-driven underwriting.
- Scalability: Grow the loan book without proportional increase in operational costs.

Open Network for Digital Commerce (ONDC)

ONDC is a government-backed digital infrastructure enabling open, interoperable e-commerce by connecting buyers, sellers, and service providers on a common network. For NBFCs, ONDC presents significant embedded finance opportunities across the e-commerce value chain.

Key Features

- Open Network: Any seller can list; any buyer can purchase.
- Interoperability: Buyers on one app can purchase from sellers on another.
- Neutral Platform: No single entity controls the network.
- Integrated Financing: Embedded credit options for buyers and sellers.
- Logistics Integration: Standardised logistics and last-mile delivery.

NBFC Opportunities — Embedded Finance

- Point-of-Sale Lending: Instant credit at checkout.
- Seller Financing: Working capital loans for ONDC sellers.
- Logistics Financing: Loans for delivery partners.
- Buy-Now-Pay-Later (BNPL): Subscription models for consumers.

Account Aggregator (AA) Framework

The Account Aggregator framework is an RBI-regulated mechanism enabling secure, consent-based sharing of financial data across institutions. Borrowers authorise data sharing; financial institutions — including banks and NBFCs — access this data via Account Aggregator intermediaries.

Key Components

- Financial Information Providers (FIPs): Banks, insurance companies, and mutual funds holding customer data.
- Financial Information Users (FIUs): Lenders, including banks and NBFCs, requesting customer data.
- Account Aggregators: Intermediaries facilitating secure data transfer.

- Consent Management: Borrowers control what data is shared and with whom.

NBFC Benefits

- Alternative Credit Data: Access to bank statements, investment history, and insurance records.
- Better Credit Assessment: Holistic view of the borrower's financial health.
- Reduced Default Risk: Data-driven underwriting using verified financial information.
- Faster Underwriting: Automated data retrieval and analysis.
- Financial Inclusion: Enable credit for borrowers with limited formal credit history.

Current Adoption (December 2023)

- 127 Financial Information Providers (FIPs), comprising banks, insurance companies, and mutual funds.
- 318 Financial Information Users (FIUs), including lenders and fintech platforms.
- 39 million accounts linked.

IV. Digitisation Across the NBFC Value Chain

Front Office — Customer Acquisition and Onboarding

The front office has undergone significant digitisation across all customer-facing functions, reducing friction, operational costs, and the need for physical infrastructure:

- eKYC and Video KYC: Electronic Know-Your-Customer processes using Aadhaar and video verification, enabling fully paperless onboarding.
- DigiLocker: Government digital document repository that substantially reduces the need for physical documentation.
- CRM and Mobile Apps: One leading NBFC has achieved 93% of its customer base on mobile platforms.
- Conversational AI: Chatbots deployed for cross-sell, up-sell, and customer service functions.

Middle Office — Credit Underwriting and Disbursement

The middle office has benefited from advances in automated underwriting and digital disbursement, transforming the speed and accuracy of credit decisions:

- GenAI-Powered Underwriting: Machine learning models use alternative data — including telecom records, utility payments, and GST filings — for credit assessment.

- e-Stamping and e-Signing: Digital document execution; at one leading NBFC, 60% of agreements are e-stamped and 46% are digitally signed.
- Real-Time Disbursements: UPI and NACH (National Automated Clearing House) enable instant fund transfer on a 24/7 basis.

Key Metrics — Digitisation

- 93% of customers on mobile platforms at a leading NBFC.
- 60% of agreements are e-stamped.
- 46% of agreements are digitally signed.
- 24/7 real-time disbursement capability.

Back Office — Collections and Customer Service

The back office has also undergone a digital revolution, with digital channels now handling the majority of customer interactions and collections:

- WhatsApp Banking: Secure messaging for account updates, payment reminders, and dispute resolution; 75% of transactions are digital at a leading NBFC.
- Voice and Chat Interactions: Over 800,000 monthly interactions via IVR systems and chatbots.
- Digital Collections: 90%+ of collections processed via digital channels — auto-debit, UPI, and SMS reminders — at leading NBFCs.
- Reduced TAT: Faster resolution cycles and significantly lower operational costs.

Analytics and Credit Intelligence

Advanced analytics and data intelligence have emerged as central pillars of NBFC competitiveness:

- Account Aggregator (AA): The RBI-regulated framework enables secure data sharing across financial institutions; 39 million accounts are linked as of December 2023.
- Alternative Data: Telecom payment history, utility bills, GST records, and e-commerce transactions are used for credit scoring.
- Predictive Analytics: Machine learning models enable early default detection and active portfolio risk management.
- Data Lakes: Centralised repositories enabling real-time insights and regulatory reporting.

Emerging Lending Models

Co-Lending

Under the RBI's 2020 co-lending guidelines, banks and NBFCs jointly finance loans, sharing credit risk, returns, and operational responsibilities per pre-agreed terms. Key features include:

- Risk Sharing: Both lenders share losses proportionally.
- Lower Cost of Funds: NBFCs access bank funding at competitive rates.
- Regulatory Support: RBI guidelines (2020) actively encourage co-lending.
- Technology Integration: Requires robust API integration between partners.
- Loan Ticket Sizes: Typically INR 5–50 lakh, focused on MSME and affordable housing.

Benefits for NBFCs include reduced funding costs, access to larger loan amounts, and improved liquidity management. For banks, co-lending provides exposure to underserved segments, leverage of NBFC credit assessment expertise, and portfolio diversification.

Default Loss Guarantee (DLG / FLDG)

The Default Loss Guarantee is a risk-sharing mechanism whereby NBFCs or Loan Service Providers (LSPs) guarantee coverage for initial default losses, enabling collaborative digital lending. Under the RBI Guidelines issued in June 2023:

- DLG is capped at 5% of the loan portfolio.
- It applies only to digital lending arrangements.
- It requires transparent disclosure to borrowers.
- It strengthens bank confidence in NBFC partnerships.

The mechanics of the DLG structure are as follows: the NBFC originates the loan and retains the first-loss position; the bank provides funding with DLG protection; if defaults exceed the threshold, the NBFC covers losses up to the 5% cap; this structure incentivises NBFCs to maintain strong credit quality. The DLG mechanism enables banks to fund digital lending with reduced risk, while NBFCs access cheaper capital and are able to scale faster.

V. Green Finance and Liquidity Management

Green Finance — Asset-Side Opportunities

India's net-zero commitment requires USD 200 billion annually in climate finance through 2030. NBFCs are well-positioned to bridge this gap through targeted green lending across multiple sectors:

14. Electric Vehicles (EVs): Growing demand driven by the FAME scheme and rising fuel costs creates a significant opportunity for NBFC EV financing at competitive rates.
15. Solar and Renewable Energy: Rooftop solar installations for residential and commercial customers offer a natural lending opportunity, including finance for solar equipment and installation.
16. Sustainable Agriculture: Precision farming, drip irrigation, and organic farming are growth segments; NBFCs can deploy microfinance products for smallholder farmers.
17. Energy Efficiency: Building retrofits, LED lighting, and HVAC upgrades can be financed through Energy-as-a-Service (EaaS) models.
18. Circular Economy and Waste Management: Recycling facilities and waste-to-energy projects present project financing opportunities for circular economy startups.

Green Finance — Funding Avenues

- Green Bonds: Debt securities where proceeds are dedicated to financing green projects; investor base comprises ESG-focused institutional investors and multilateral development banks; key benefit is access to lower coupon rates due to a sustainability premium.
- Sustainability-Linked Loans (SLLs): Loans with interest rates tied to the NBFC's ESG performance metrics, directly incentivising sustainable business practices.
- Multilateral and Blended Finance: Funding from development finance institutions — such as the World Bank, ADB, and IFCI — provides access to cheaper capital for green projects.
- Impact Investing and ESG Funds: Private equity and venture capital focused on sustainable businesses provides strategic capital with a long-term investment horizon.

Green Finance — Strategic Benefits and Best Practices

Strategic Benefits

- Diversified Loan Book: Reduces concentration risk in traditional lending portfolios.
- Lower Cost of Capital: Green bonds and SLLs offer cheaper funding than conventional instruments.
- Net-Zero Trajectory: Aligns NBFC operations with India's climate commitments.

- ESG Integration: Enhanced corporate governance and improved stakeholder trust.
- Regulatory Alignment: Potential regulatory incentives, including lower risk weights for green assets.

Best Practices

- Establish a Green Finance Committee at the board level with oversight of green lending strategy.
- Develop a Green Lending Policy with clear criteria for green asset classification.
- Build technical expertise by hiring specialists in renewable energy and sustainable agriculture.
- Partner with environmental consultants and impact measurement firms.
- Publish annual green finance disclosures aligned with the Task Force on Climate-related Financial Disclosures (TCFD).
- Track environmental outcomes, including CO2 avoided and renewable energy capacity added.
- Provide regular updates to green bond investors on portfolio performance.

Liquidity and Fund Management

Part 1: Funding Sources

Total NBFC borrowings grew by 16.2% between FY22 and September 2023. Bank borrowings and debentures remain dominant, each accounting for approximately 37% of total funding. The table below summarises total NBFC borrowings by source (in INR crore):

Source	March 2022 (INR Crore)	September 2023 (INR Crore)
Debentures	10,14,611	11,45,536
Bank Borrowings	9,20,555	11,97,626
Commercial Paper	70,266	1,14,109
Other Borrowings	3,29,182	4,21,653
Total	25,84,500	31,69,959

Emerging funding avenues include: Foreign Direct Investment (FDI) for access to cheaper foreign capital; securitisation to convert loan portfolios into tradeable securities;

Private Equity and Venture Capital for equity injection; Green Bonds for sustainable project financing; and Public Deposits as fixed-maturity deposits sourced from the public.

Part 2: Regulatory Framework — Liquidity Management

The liquidity management framework for NBFCs rests on four key pillars:

19. Regulatory Reporting: Comprising the Statutory Liquidity Statement (SLS) for daily reporting of liquid assets; the Short-Term Deposits (STD) monitoring mechanism; and the Liquidity Coverage Ratio (LCR), which systemically important NBFCs must maintain at 85%, rising to 100% by December 2024.
20. Behavioural Analysis: Including analysis of prepayment behaviour, non-maturity deposit stability, and stress testing under adverse shock scenarios.
21. Interest Rate Risk in the Banking Book (IRRBB): The RBI's IRRBB framework (February 2023) assesses the impact of interest rate changes through two primary measures — the Economic Value of Equity (EVE) for long-term net worth impact, and Net Interest Income (NII) for short- term earnings impact. A six-shock scenario analysis is mandated for upper-layer NBFCs.
22. Stress Testing and Contingency Planning: Encompassing the stock approach for current liquidity assessment, the flow approach for projected cash inflows and outflows, and scenario analysis under adverse conditions.

A significant regulatory development has been the increase in risk weights for consumer lending to 125% (from 100%), and the increase in bank exposure risk weights to A-rated NBFCs by 25%, raising the effective cost of bank funding for NBFCs. These changes necessitate strong liquidity buffers and diversified funding sources.

VI. Competition from Banks

Part 1: Market Share Pressures

Banks are increasingly competing with NBFCs in traditional NBFC segments through aggressive pricing, technology adoption, and structural regulatory advantages. Key areas of competitive pressure include:

Housing Finance

- Trend: HFCs and NBFCs have lost approximately 6% market share between FY19 and FY23.
- Reason: Banks offer competitive rates and faster approvals.
- NBFC Response: Focus on affordable housing (below INR 50 lakh) and co-lending partnerships.

Auto Loans

- Trend: NBFCs have lost more than 10% market share to banks.
- Reason: Banks offer lower rates and flexible tenors.
- NBFC Response: Focus on used vehicle financing and commercial vehicles.

Gold Loans

- Trend: Banks are permitted a 90% Loan-to-Value (LTV) ratio, compared to 75% for NBFCs.
- Reason: Higher LTV increases effective loan size and customer appeal.
- NBFC Response: Differentiate through faster approvals and omnichannel service delivery.

Loan Against Property (LAP)

- Trend: Private banks growing disbursements at 20–25% CAGR.
- Reason: Banks leverage property collateral and benefit from a lower cost of capital.
- NBFC Response: Focus on smaller ticket sizes (below INR 25 lakh).

Part 2: Technology and M&A Dynamics

Account Aggregator and Information Asymmetry

With 127 FIPs, 318 FIUs, and 39 million accounts linked as of December 2023, the Account Aggregator framework has significantly levelled the information asymmetry that previously favoured NBFCs. Banks can now access the same credit data as NBFCs, reducing one of the key competitive advantages historically enjoyed by specialised lenders. NBFCs must respond by differentiating through superior underwriting models and faster credit decision-making.

M&A Themes

- Microfinance Consolidation: Banks acquiring microfinance NBFCs to meet Priority Sector Lending (PSL) targets.
- Public Bank Consolidation: The government is consolidating public sector banks to create larger, more competitive entities.
- Fintech-Banking Tie-ups: Banks partnering with fintechs for digital lending capabilities.

Partnerships are increasingly viewed as a viable alternative to M&A, given high valuation multiples. Partnerships allow NBFCs to retain independence while accessing bank capital and distribution. Examples include co-lending partnerships, securitisation arrangements, and technology partnerships.

Part 3: NBFC Competitive Advantages

Despite intensifying competition, NBFCs possess inherent strengths that allow them to compete effectively:

- Deep Market Understanding: Established relationships and credit assessment expertise in underserved segments that banks have not historically served.
- Operational Agility: Faster decision-making and more rapid product innovation compared to larger, more bureaucratic banking institutions.
- Specialised Expertise: Deep domain knowledge in specific segments — microfinance, vehicle finance, gold loans — that is difficult for banks to replicate.
- Technology and Fintech Partnerships: Strong ability to partner with fintechs and leverage emerging technologies, including GenAI.
- Cost Structure: Lower regulatory costs for smaller, Base Layer NBFCs relative to bank-regulated entities.

Strategic Imperatives for Competitiveness

- Focus on Underserved Segments: Concentrate on borrowers and geographies where banks have limited presence.
- Differentiate Through Service: Offer faster approvals, flexible repayment terms, and omnichannel service delivery.
- Leverage Technology: Invest in GenAI, data analytics, and digital origination platforms.
- Build Strategic Partnerships: Pursue co-lending with banks, fintech partnerships, and securitisation arrangements.
- Consolidate and Scale: Pursue M&A where necessary to achieve the scale required to compete with banks.

VI. Regulatory Landscape

Scale-Based Regulation (SBR)

The SBR framework, introduced in October 2022, is a differentiated regulatory architecture that applies prudential norms proportional to an NBFC's asset size and systemic

importance. It comprises four layers— Base, Middle, Upper, and Top — as described in Chapter II. The SBR framework aligns NBFC oversight

with systemic risk, incentivises consolidation among smaller players, and raises compliance costs for larger institutions.

Digital Lending Guidelines (September 2022)

The RBI's Digital Lending Guidelines govern digital lending platforms, Loan Service Providers (LSPs), and the use of alternative data in credit assessment. Key requirements include:

- Transparent Loan Terms: Clear disclosure of interest rates, fees, tenure, and penalties.
- LSP Governance: Accountability for third-party loan origination and customer protection.
- Data Usage: Explicit consent required for data collection and use.
- Default Loss Guarantee (DLG): Capped at 5% of the loan portfolio.
- Customer Grievance Redressal: A mandatory ombudsman mechanism must be in place.

These guidelines protect borrowers from predatory lending, enable fintech-NBFC partnerships, and strengthen customer trust and regulatory compliance.

Pillar 3: Technology Risk Management (April 2023)

The RBI's Technology Risk Management framework requires NBFCs to establish robust IT governance, cyber security, and business continuity frameworks. Key components include:

- IT Governance: Board-level oversight, CIO accountability, and alignment of technology strategy with business objectives.
- Cyber Security: Multi-factor authentication (MFA), encryption, intrusion detection, and documented incident response protocols.
- Business Continuity Planning (BCP) and Disaster Recovery (DR): Recovery Time Objective (RTO) of 4 hours or less, and Recovery Point Objective (RPO) of 1 hour or less for critical systems.
- Third-Party Risk Management: Due diligence on IT service providers, service level agreements (SLAs), and audit rights.

Pillar 4: Data Protection — Digital Personal Data Protection Act (DPDPA 2023)

The DPDPA 2023 is India's comprehensive data protection law requiring explicit consent, transparency, and individual rights over personal data. Key provisions include:

- Explicit Consent: Individuals must opt in for all data collection and processing.
- Right to Access: Individuals can request copies of their personal data within 30 days.
- Right to Erasure: Individuals can request deletion of their data under specified conditions.
- Right to Correction: Individuals can request correction of inaccurate data.
- Purpose Limitation: Data may only be used for the purposes stated at collection.
- Data Minimisation: Only the data strictly necessary for the stated purpose should be collected.
- Privacy Notice: Must be provided in all 22 constitutionally recognised languages.
- Data Localization: Sensitive personal data must be stored within India.

The supervisory outlook indicates that the RBI is narrowing the regulatory gap between banks and NBFCs. Further reforms are expected in governance, liquidity, asset quality, and digital lending. Upper-layer NBFCs should anticipate increasingly bank-like regulatory requirements.

VIII. Cyber Security, Business Continuity, and Data Privacy

Cyber Security Framework in NBFCs

The RBI's Technology Risk Master Directions (April 2023) establish mandatory frameworks for cyber resilience. Key requirements for NBFCs include:

- Multi-Factor Authentication (MFA): Mandatory for all critical system access.
- Encryption: Data-in-transit and data-at-rest protection using industry standards.
- Intrusion Detection and Prevention: Real-time monitoring of network traffic.
- Vulnerability Management: Regular penetration testing and patch management.
- Incident Response Plan: Documented procedures for detection, containment, and recovery.
- Security Awareness Training: Mandatory for all staff.

Business Continuity and Disaster Recovery (BCP/DR)

Business Continuity and Disaster Recovery frameworks ensure that NBFC operations continue or resume quickly following disruptions — including natural disasters, cyber attacks, and infrastructure failures. RBI requirements include:

- Recovery Time Objective (RTO): Four hours or less for critical systems.
- Recovery Point Objective (RPO): One hour or less for critical data.
- Alternate Site: Geographically separated backup facility with real-time data replication.
- Testing: Quarterly BCP/DR drills with documented results.
- Third-Party Dependencies: Contractual SLAs with IT service providers and backup vendors.

Robust BCP/DR frameworks ensure operational resilience during crises, protect customer data and transactions, maintain regulatory compliance, and reduce financial and reputational losses.

Third-Party Risk Management in NBFCs

Third-Party Risk Management involves due diligence and ongoing monitoring of external IT service providers to ensure they meet the NBFC's security and operational standards. The RBI IT Outsourcing Master Directions (October 2023) mandate the following key controls:

- Pre-Engagement Due Diligence: Assessment of vendor security posture and certifications (e.g., ISO 27001, SOC 2).
- Service Level Agreements (SLAs): Defined uptime, performance, and security standards with penalty clauses.
- Audit Rights: The NBFC's right to audit vendor systems and processes.
- Data Handling: Contractual restrictions on data access, sub-contracting, and cross-border data transfers.
- Exit Strategy: Clear procedures for data retrieval and system transition if a vendor relationship ends.

Implementation Challenges

- Legacy Systems: Older platforms may lack encryption and audit trail capabilities.
- Cost of Compliance: Significant investment required in technology and staff training.

- Talent Shortage: Limited availability of qualified cyber security specialists.
- Vendor Management: Ensuring third-party compliance across complex, multi-vendor IT ecosystems.

IX. Financial Performance

Part 1: Asset Quality Metrics

NBFC financial health is assessed through asset quality metrics, profitability ratios, and capital adequacy measures. Key definitions and current benchmarks as of September 2023 are presented in the table below:

Metric	Definition	Sep 2023 Value	Benchmark
GNPA	Loans where borrowers have defaulted for 90+ days	4.6%	< 4.5%
NNPA	GNPA less provisions and recoveries	1.5%	< 1.5%
PCR	Provisions as % of GNPA	68.9%	> 70%
CRAR	Captal-to-Risk-Weighted Assets Ratio	27.6%	Min. 15%

Part 2: Profitability and Growth Outlook

Key profitability metrics and their benchmarks are presented below:

Metric	Benchmark	Interpretation
Credit Growth	> 20%	Indicates market expansion and competitive positioning
Net Interest Margin (NIM)	> 5%	Spread between lending and borrowing rates
Return on Assets (ROA)	> 2.5%	Net profit as a percentage of total assets
Return on Equity (ROE)	> 15%	Net profit as a percentage of shareholders' equity

NBFC credit is projected to reach INR 42 trillion by FY25, growing at a 12–14% CAGR. Key growth drivers include:

23. Unsecured MSME Loans (below INR 5 lakh): Rapid growth driven by digital underwriting and Account Aggregator data.
24. Vehicle Finance: Steady demand from auto sector recovery and rural penetration.
25. Affordable Housing (average ticket INR 9–12 lakh): Government support and rising urbanisation.
26. Gold Loans: Stable collateral-based lending with lower default rates.
27. Microfinance: Expansion into underserved rural and semi-urban markets.

The NBFC sector demonstrates strong fundamentals, with improving asset quality, robust capital buffers, and diversified growth drivers. However, rising regulatory costs and increasing bank competition require continued operational excellence and innovation.

X. Conclusion: The Road Ahead for NBFCs

NBFCs are expected to play a crucial role in India's growth story, fuelling formalised credit penetration among the underserved. Policy push, regulatory oversight, and digital transformation across the value chain are expected to define the sector's trajectory through 2030.

Strategic Imperatives for NBFC Growth

1. Sourcing and AUM Expansion

- Target: NBFC AUM to reach INR 42 trillion by FY25, implying a 12–14% CAGR.
- Focus: MSME, vehicle finance, affordable housing, and microfinance.
- Strategy: Leverage co-lending partnerships and digital origination to scale efficiently.
- Risk: Bank competition and regulatory cost pressures.

2. Asset Quality and Collections

- Current Position: GNPA at 4.6% and PCR at 68.9% — sustained improvement is expected.
- Enabler: Analytics-driven collections using predictive models and alternative data.
- Challenge: Rising delinquencies in unsecured segments necessitate robust underwriting.

- Opportunity: Account Aggregator data enabling significantly better credit assessment.

3. Diversified Funding and Liquidity

- Challenge: Over-reliance on bank borrowings and debentures.
- Solution: Diversification into securitisation, green bonds, PE/VC, and public deposits.
- Regulatory: LCR compliance at 85% by December 2024, rising to 100% thereafter.
- Outcome: Lower cost of capital and reduced refinancing risk.

4. Digital and Technology Leadership

- Imperative: GenAI, LLMs, and the Account Aggregator framework are redefining underwriting.
- Investment: Cloud infrastructure, data lakes, and advanced analytics.
- Compliance: RBI Technology Risk Master Directions and DPDPA 2023.
- Competitive Advantage: Faster credit decisions, lower operational costs, and better customer experience.

5. Regulatory Compliance and Governance

- Scale-Based Regulation: Upper-layer NBFCs face increasingly bank-like requirements.
- Capital Adequacy: CRAR at 27.6%; ICAAP and stress testing are mandatory.
- Cyber and Data: BCP/DR (RTO of 4 hours or less), DPDPA compliance, and third-party risk management.
- Board Oversight: Regular reporting on technology, cyber, and data privacy risks.

Outlook and Opportunities

The NBFC sector stands at an inflection point. Regulatory clarity, digital maturity, and policy support together create a favourable environment for growth. However, sustained success requires:

- Operational Excellence: Efficient underwriting, collections, and cost management.
- Innovation: Fintech partnerships, alternative lending models, and green finance.
- Resilience: Strong capital buffers, diversified funding, and robust risk management.

- Customer Focus: Transparent pricing, fair practices, and a commitment to financial inclusion.

NBFCs that master these dimensions will emerge as critical pillars of India's financial system, driving credit penetration and economic growth through 2030 and beyond.

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Interconnectedness and Collective Well-being: Eastern Himalayan Philosophies and the Normative Reconstruction of Economic Development

Somdatta Bhattacharyya[1]

Abstract

The dominant paradigms of economic development, grounded in utilitarian and growth-centric frameworks, have proven inadequate in addressing the ecological fragility and socio-cultural diversity of the Eastern Himalayan region. These models are based on an atomistic ontology that conceives individuals as isolated agents and nature as an external resource, thereby neglecting the relational foundations of human existence. In contrast, Eastern Himalayan philosophical traditions, deeply influenced by Buddhist and indigenous ontologies, emphasize interconnectedness as the fundamental nature of reality. This relational worldview offers a normative foundation for rethinking economic development in terms of collective well-being rather than individual accumulation. This article provides a philosophical analysis of interconnectedness as an ontological and ethical principle in Eastern Himalayan thought and explores its implications for contemporary economic development. It engages critically with the capability approach developed by Sen (1999) and Nussbaum (2011), arguing that while the capability framework moves beyond resource-based metrics, its normative potential can be further deepened through integration with relational ontology. The article proposes a relational capability framework that redefines development as the expansion of relational well-being encompassing ecological sustainability, social inclusion, and collective flourishing. By synthesizing indigenous philosophy and contemporary normative economics, this study contributes to the philosophical reconstruction of development theory and provides a conceptual foundation for sustainable and locally anchored economic models in ecologically fragile regions.

Keywords: interconnectedness, Eastern Himalayas, capability approach, relational ontology, Buddhist philosophy, collective well-being, development ethics

Section I

Introduction: The Philosophical Crisis of Development

The modern conception of economic development has been dominated by a growth-centric paradigm that prioritizes material production, income expansion, and technological advancement. This paradigm is ingrained in utilitarian and neoclassical economic thought, which conceptualizes individuals as rational agents tracking self-interest within a framework of market exchange (Sen, 1999). Development, within this framework, is for the most part measured through quantitative indicators such as gross domestic product, income levels, and consumption capacity. However, this conception of development is philosophically and practically inadequate, particularly in ecologically delicate and culturally diverse regions such as the Eastern Himalayas. The region represents a unique ecological and civilizational zone characterized by fragile mountain ecosystems, rich biodiversity, and deeply rooted indigenous cultural traditions (Subba, 2008). Economic models that prioritize resource withdrawal and growth without regard for ecological and cultural contexts often lead to environmental degradation, cultural erosion, and social fragmentation.

The inadequacy of conventional development models emerges not merely from technical limitations but from deeper philosophical assumptions about the nature of human existence and well-being. Modern economic thought is founded in what may be termed an atomistic ontology, the perspective that individuals exist as independent and self-contained entities whose well-being can be understood independently of their relationships with others and with nature (Escobar, 2012). Nature, within this framework, is condensed to a resource, and social relationships are viewed primarily in instrumental terms. This atomistic conception rests in sharp contrast to the philosophical traditions of the Eastern Himalayas, which are grounded in a relational ontology calling attention to interconnectedness as the fundamental nature of existence. According to this worldview, individuals do not exist independently but comprise through relationships with community, nature, and the cosmos. Human well-being, therefore, cannot be understood in seclusion but must be understood as part of a larger network of relational existence.

The philosophical significance of interconnectedness lies in its challenge to the metaphysical foundations of modern economic thought. If existence is fundamentally relational, then development cannot be understood merely as individual accumulation. It can be understood as the thriving of relational systems that cover individuals, communities, and ecological environments. The capability approach developed by Sen (1999) represents an important step toward attending to the limitations of conventional economic models. Sen argues that development should be understood as the growth of human capabilities, the substantive freedom so that individuals can live meaningful lives. This framework swings the focus from material resources to human flourishing. However, while the capability approach identifies the importance of social conditions, it remains primarily focused on individual capabilities. Nussbaum (2011) furthermore builds up this framework by em-

phasizing the importance of relational capabilities such as affiliation and care for other species. Her work moves closer to a relational conception of well-being but does not fully express the ontological foundations of relational existence.

Eastern Himalayan philosophical traditions provide precisely this ontological foundation. These traditions affirm that interconnectedness is not simply an ethical ideal but the fundamental nature of reality itself. This article enquires that integrating Eastern Himalayan relational ontology with the capability approach provides a philosophically robust foundation for rethinking about the very notion of development. Such integration facilitates the formulation of a relational capability framework in which development is understood as the expansion of relational well-being encompassing ecological sustainability, social inclusion, and collective flourishing.

Section II

Ontological Foundations of Interconnectedness in Buddhist Philosophy

The principle of interconnectedness finds its most systematic philosophical expression in Buddhist metaphysics, which has profoundly shaped the intellectual and cultural traditions of the Eastern Himalayan region. The Buddhist doctrine of dependent origination (pratītyasamutpāda) affirms that all phenomena arise in dependence upon causes and conditions and be short of independent existence (Rahula, 1974). Dependent origination corresponds to a radical departure

from substance-based metaphysics, which assumes that entities possess independent and self-contained existence. Instead, Buddhist philosophy asserts that existence is fundamentally relational. Phenomena exist only in relation to other phenomena; nothing exists independently. It is to mention that, Nāgārjuna's philosophical analysis of emptiness (śūnyatā) provides the most rigorous articulation of this relational ontology. Nāgārjuna argues that all phenomena are empty of inherent existence because their existence depends upon causal and conceptual relations (Garfield, 1995). According to this notion, emptiness does not imply non-existence but relational existence. To exist is to exist in dependence upon other phenomena. As Nāgārjuna states: "Whatever is dependently arisen, that is explained to be emptiness" (Nāgārjuna, trans. Garfield, 1995, p. 69). This insight has intense philosophical implications. It implies that the distinction between self and other, human and nature, and individual and community is not absolute but relational.

The Buddhist doctrine of non-self (anatta) further strengthens this relational ontology. According to this doctrine, the self is not a permanent and independent entity but a dynamic process constituted by physical, psychological, and social conditions (Rahula, 1974). The self exists only in relation to other beings and to the environment. This relational conception of the self has moral/ethical implications. If the self is relational, then

the well-being of the self cannot be separated from the well-being of others. Harm to others ultimately constitutes harm to oneself. Modern philosophical interpretations of Buddhist metaphysics have emphasized its relevance for ecological and social philosophy. Macy (1991) argues that dependent origination provides a metaphysical foundation for ecological thinking by affirming the interdependence of all living systems. Similarly, Loy (1997) argues that Buddhist relational ontology challenges the individualistic assumptions of modern Western thought.

The ethical implications of interconnectedness are further elaborated in Buddhist ethical teachings, which emphasize compassion (karuṇā) and non-harm (ahiṃsā). Compassion emerges naturally from the recognition of interconnectedness. When individuals recognize their relational existence, the suffering of others is understood as inseparable from their own existence. The Dalai Lama (1999) emphatically opines that ethical responsibility arises from the recognition of interdependence. Human well-being depends upon harmonious relationships with others and with nature. For this reason, interconnectedness is not merely a metaphysical doctrine but an ethical and existential principle that defines the nature of human existence and well-being. This relational ontology provides a philosophical foundation for rethinking economic development. If human existence is fundamentally relational, then economic systems have to be evaluated in terms of their impact on relational well-being rather than merely individual accumulation. The Buddhist conception of interconnectedness challenges the atomistic assumptions underlying modern economic thought and provides a normative framework for relational economic development.

Section III

Indigenous Eastern Himalayan Philosophies and Collective Ontology

While Buddhist philosophy provides a systematic metaphysical articulation of interconnectedness, indigenous philosophical traditions of the Eastern Himalayan region represent relational ontology in lived social, ecological, and cultural practices. These traditions do not merely theorize interconnectedness abstractly but express it through everyday modes of existence, social organization, and ecological engagement.

Indigenous communities of the Eastern Himalayas including Lepcha, Bhutia, Monpa, Sherpa, and various tribal groups of Northeast India, traditionally visualize nature not as an inert object but as a living, sacred reality (Subba, 2008). Mountains, rivers, forests, and animals are comprehended as possessing intrinsic value and spiritual significance. Human existence is viewed as embedded within this larger ecological order. This worldview reflects what may be termed a participatory ontology, in which human beings are participants in, rather than controllers of, the natural world. Such ontology stands in contrast to the mechanistic worldview underlying modern economic development, which considers

nature as a passive resource available for exploitation (Shiva, 1989). The participatory ontology of indigenous Himalayan traditions is closely linked to communal social organization. Social identity is defined primarily in relational rather than individualistic terms. The individual is understood as a member of a community whose existence and well-being depend upon collective relationships. Subba (2008) observes that indigenous Himalayan communities emphasize cooperation, reciprocity, and mutual care as fundamental social values. These values are reflected in traditional economic

practices such as shared labor systems, communal land management, and collective decision-making processes. Such practices are not merely economic arrangements but expressions of an underlying philosophical understanding of interconnected existence. Economic activity is not seen as an autonomous domain governed exclusively by profit but as an integral aspect of social and ecological relationships.

This relational conception of economic life reflects a moral/ethical orientation toward collective well-being rather than individual accumulation. Well-being is realized not in terms of individual wealth but in terms of social harmony, ecological balance, and community flourishing or growth. The sacred dimension of nature in indigenous Himalayan philosophy further underpins this relational ethics. Sharma (1998) monitors that - many Himalayan communities regard natural environments as sacred spaces that is to be respected and protected. This sacred worldview functions as a normative constraint on economic activity, which put a stop to ecological exploitation. From a philosophical point of view, this indigenous worldview embodies what can be termed ecological relationalism, the acknowledgment that human existence is ontologically and ethically inseparable from ecological systems. This relational ontology has insightful implications for development philosophy. It suggests that economic development is to be assessed not only in terms of economic output but in respect to its impact on ecological and social relationships. So it follows that, indigenous Himalayan philosophy provides both an ontological foundation and an ethical framework for relational economic development.

Section IV

Philosophical Critique of Atomistic Individualism in Modern Economic Thought

Modern economic theory is grounded in a philosophical anthropology that envisages human beings as rational, self-interested, and autonomous agents. This conception, often submits as methodological individualism, assumes that social phenomena can be explained as the aggregate outcome of individual choices (Sen, 1999). This atomistic conception of the individual mirrors deeper metaphysical assumptions inherited from Enlightenment rationalism and Cartesian dualism, which actually separate the individual from society and humanity from nature (Escobar, 2012). From a relational philosophical viewpoint, this conception is fundamentally flawed because it ignores the relational conditions that

make individual existence possible. Human beings are inherently dependent upon social relationships, ecological systems, and cultural contexts. Sen (1999) himself criticizes narrow economic models that trims down to human well-being to income and utility. He analyzes that such models fail to capture the multidimensional nature of human flourishing. However, Sen's critique remains primarily focused on expanding the evaluative space of development rather than reconstructing its ontological basis.

The philosophical limitations of atomistic individualism become particularly obvious in ecologically delicate regions such as the Eastern Himalayas. Economic policies based on resource extraction and profit maximization frequently interrupt ecological systems and destabilize community cohesion. Schumacher (1973) argues that modern economic thought is founded on an illusion of separateness that ignores the ecological embedded-ness of human existence. He focuses on the view that economic systems are needed to be designed in accordance with ecological and human realities rather than abstract theoretical assumptions. Similarly, ecological philosophers such as Bandana Shiva (1989) argue that modern development represents a form of epistemic and ontological violence that dislocates indigenous relational worldviews. The philosophical error underlying conventional development models lies in their malfunction to recognize that individuals exist within relational networks. Economic systems that ignore relational existence ultimately weaken the conditions necessary for sustainable well-being. Eastern Himalayan philosophies give a corrective to this error by affirming that existence is fundamentally relational and that well-being can be understood collectively rather than individually.

Section V

Capability Approach and Relational Ontology: Toward Philosophical Integration

The capability approach developed by Sen (1999) and further elaborated by Nussbaum (2011) represents one of the most important philosophical advances in development theory. By defining development as the expansion of human capabilities rather than income growth, the capability approach shifts the focal point from economic means to human ends. Sen classifies capabilities as the substantive freedoms individuals have to achieve valued ways of being and doing (Sen,1999). This conception shows that development has to be evaluated in terms of human flourishing rather than economic output. Nussbaum (2011) extends this framework by identifying central human capabilities necessary for a dignified human life, including affiliation, emotional development, and relationships with other species. The inclusion of affiliation as a central capability puts forward a significant movement toward a relational conception of human well-being. Nussbaum emphasizes that human beings are inherently social and that meaningful relationships are essential for human flourishing.

However, while the capability approach recognizes the importance of relationships, it does not fully articulate the ontological foundation of relational existence. It treats relationships as important aspects of human well-being but does not explicitly affirm that existence itself is relational. Eastern Himalayan philosophical traditions provide this ontological grounding. By asserting that existence itself is constituted by relationships, these traditions expand the philosophical foundation of the capability approach. From a relational ontological perspective, capabilities cannot be understood merely as individual attributes but is to be understood as relational capacities that arise within social and ecological contexts. This insight leads to the formulation of what may be termed a relational capability framework.

Section VI

Toward a Relational Capability Framework: A Philosophical Reconstruction of Development

The integration of Eastern Himalayan relational ontology with the capability approach enables the formulation of a relational capability framework that re-conceptualizes development in fundamentally philosophical terms. Within this framework, development is explained not merely as the expansion of individual capabilities but as the expansion of relational capabilities, the capacity of individuals and communities to sustain meaningful relationships with others and with nature. Now what do we mean by relational capabilities? We are here putting forward a brief outline which has the potential to ponder upon a vivid research.

Relational capabilities include:

- The capability to participate in community life
- The capability to sustain ecological relationships
- The capability to engage in cooperative economic activity
- The capability to preserve cultural identity
- The capability to live within sustainable ecological systems

These capabilities are not reducible to individual attributes but emerge within relational networks.

This relational framework transforms the normative goal of development. The goal is no longer merely individual prosperity but collective flourishing. From this perspective, economic empowerment can be understood in relational rather than purely individual terms. Economic initiatives that strengthen community relationships, enhance ecological sustainability, and promote social inclusion contribute to relational well-being. This rela-

tional capability framework also provides a philosophical foundation for evaluating economic policies. To mention, policies could be evaluated not merely in terms of economic efficiency but in terms of their impact on relational well-being. Therefore, relational ontology provides the missing philosophical foundation for development theory.

Section VII

Conclusion: Interconnectedness and the Future of Development Philosophy

The crisis of modern development emerges from its philosophical foundations. By conceiving individuals as isolated agents and nature as an external resource, conventional development models undermine the relational conditions necessary for sustainable well-being. Eastern Himalayan philosophical traditions present a profound alternative grounded in relational ontology and collective well-being. These traditions affirm that human existence is fundamentally interconnected with social and ecological systems. The capability approach developed by Sen and Nussbaum offers an important step toward a more humane conception of development. However, its philosophical foundation can be further strengthened through integration with relational ontology.

Finally to sum up, the relational capability framework developed in this article provides a philosophical reconstruction of development grounded in interconnectedness. This framework redefines development as the expansion of relational well-being encompassing ecological sustainability, social inclusion, and collective flourishing. Such a framework is specifically relevant for ecologically fragile and culturally rich regions such as the Eastern Himalayas, where relational existence remains a lived philosophical reality. The future of development depends not merely on technological innovation or economic growth but on a fundamental philosophical transformation from atomistic individualism to relational interconnectedness. In this discussion some socio-economical as well as philosophical insights have been brought up which can be explored in the discussion of developmental economics in spite of the fact regarding the difficulties in practical implementation, as in present situation and context, such interdisciplinary dialogue have become extremely meaningful and useful.

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What drives Private Electric Mobility in India? An analysis based on FAME policy regimes

Sweeyam Chakraborty[1]

&

Sudakshina Gupta[2]

Abstract

This pa*per studies what shapes private electric vehicle adoption in India across two-wheelers and four-wheelers under the Faster Adoption and Manufacturing of Electric vehicles(FAME) policy regime. It uses state and union territory data for 2014–15, 2018–19, and 2021–22, and estimates six separate OLS models. The main focus is on Electric Vehicle (EV) prices, fuel and electricity costs, per capita income, higher education, and PM2.5 pollution. A synthetic on-road EV price series is built because historical state-wise price data are not available. The results show a clear and steady role for higher education in both vehicle segments. Per capita income matters strongly for four-wheelers, but not for two-wheelers. EV price, fuel cost, electricity cost, and pollution do not show a stable effect in the regressions. The paper suggests that EV adoption in India is shaped more by human capital and a*ffluence than by simple price signals alone.

Keywords: Electric vehicle adoption; FAME policy; India; state-level analysis; private mobility
JEL Classification No.s:L62, Q55, R48, O33.

1. Introduction

The Electric Vehicle (EV) industry in India has gained significant importance throughout the last decade as a prominent alternative to the incumbent Internal Combustion Engine (ICE) technology dominated automobile industry owing to intensifying climate change crisis, COP^ targets raising the bar each year, rising oil-import burden amidst war induced international price volatility and also to retain India's dominant position in the global automobile market. Initially EVs, at their nascent stage, were limited to small low

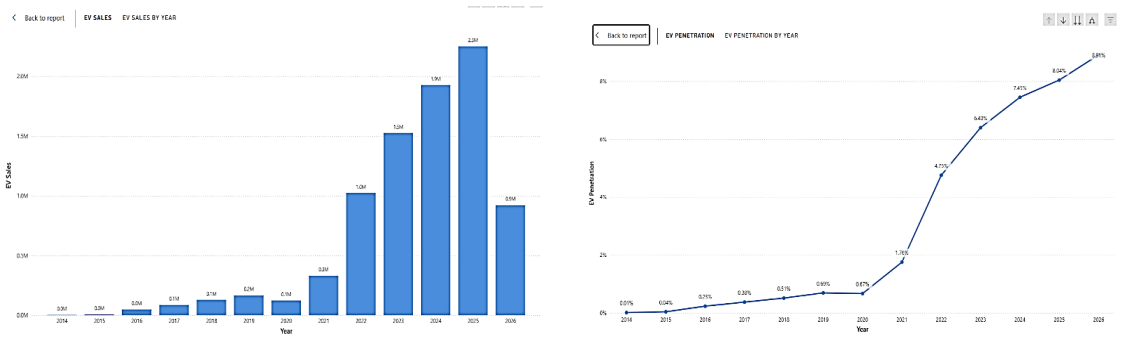
1.Junior Research Fellow, Centre for Urban Economic Studies, University of Calcutta (Corresponding author)

2. Professor, Department of Economics, University of Calcutta

speed vehicles meant for shorter rides and slower drives. However, the picture changed as Government policy vigorously boosted the market gradually throughout the last decade. Now, across every transport category EVs are seen as a viable alternative. The domain of this paper is strictly limited to private two-wheelers and four-wheelers[#] only. While central or state policy can directly augment the public transportation fleet composition of ICE vehicles (ICEV) and EVs, demand for EVs in private transport sector can only be affected indirectly through incentives in the short run and market diffusion in the long run (Dhar, et al., 2017)[1].

EV policy in India is primarily shaped by the Faster Adoption and Manufacturing of Electric Vehicles (FAME) India scheme. Launched in 2015 by the Government of India and split between two broad phases, this scheme played a significant role in accelerating electric mobility adoption in India by encouraging large-scale electric vehicle (EV) deployment, expanding charging infrastructure, and promoting domestic manufacturing capabilities.

Fig 1: EV adoption & penetration in India (2014-2024)



Source: Clean Mobility Shift EV Vahan Dashboard2

Phase I (1 April 2015 to 31 March 2019) of the scheme functioned primarily as a pilot intervention designed to assess technological feasibility, market responsiveness, and implementation readiness. During this period, approximately 280,000 electric and hybrid vehicles received financial incentives amounting to ₹359 crore. In addition, 425 electric and hybrid buses were sanctioned and deployed across several Indian cities with government support of approximately ₹280 crore. The scheme also sanctioned 520 charging

^United Nations Framework Convention on Climate Change Conference of the Parties

Categories: Two-wheeler non transport and LMV non transport.

Fuel type: BOV (Battery Operated Vehicle) and Pure EV.

stations with an allocation of ₹43 crore. Beyond vehicle deployment, Phase I emphasized technological capability building. Projects valued at approximately ₹158 crore were sanctioned for research and development activities, including the establishment of testing infrastructure and Centres of Excellence dedicated to advanced research in electrified transportation and battery engineering.

Phase II (1 April 2019 to 31 March 2024) of the scheme substantially expanded the financial outlay to ₹11,500 crore. This phase marked a transition from pilot experimentation to large-scale market deployment. During the implementation period, a total of 1,671,606 electric vehicles were supported under the scheme. In the public transport segment, 5,195 electric buses had been deployed under the programme by 31 January 2026. Furthermore, the development of charging infrastructure progressed considerably, with 9,159 EV public charging stations installed under Phase II as of 1 January 2026 (Government of India, Ministry of Heavy Industries, 2026)[3].

It should be noted that the second phase of FAME went through several modifications. Based on implementation experience, the demand incentive for electric two-wheelers was raised from ₹10,000 per kWh to ₹15,000 per kWh, while the incentive ceiling was increased from 20 percent to 40 percent of vehicle cost. At the same time, the scheme's validity was extended by two years up to 31 March 2024. This 2021 redesign is widely regarded as the most important policy inflection point within FAME II because it materially strengthened the incentive architecture and accelerated electric two-wheeler adoption (Gulati, 2022)[4]. Another important revision occurred in 2023, when the government rationalised electric two-wheeler subsidies from 1 June 2023. Under the revised structure, the demand incentive for electric two-wheelers was reduced to ₹10,000 per kWh, and the maximum subsidy cap was lowered from 40 percent to 15 percent of ex-factory price. This marked a shift away from the more expansionary 2021 support regime toward gradual fiscal moderation as the scheme approached its closing phase (PIB, 2023)[5]. Thus, 2021–22 serves as a methodologically meaningful benchmark since it captures not only the complete impact of FAME II's initial version but also incorporates the first sustained effects of the redesigned policy regime, which is better than merely accounting for the scheme's initial rollout phase or the fluctuation followed by subsidy rationalisation in the later years.

Overall, the evolution from Phase I to Phase II of the FAME programme reflects a gradual but deliberate policy transition from pilot-based experimentation to large-scale deployment, infrastructure expansion, and ecosystem deepening within India's electric mobility transition.

Drawing on the significance of FAME scheme in India, this paper aims at estimating the effect of several socio-economic factors affecting EV sales across the two private

transport categories previously stated across three different time periods:

1. Pre-FAME period (2014-15)
2. Transition period between FAME I & FAME II period (2018-19)
3. FAME II peak period and policy revision period (2021-22)

Economic factors taken into consideration are EV purchase price, electricity cost as a proxy of running cost, fuel (petrol and diesel) cost as proxy of running cost of substitute and social and environmental control factors like per capita net state domestic product (PCNSDP) as proxy of economic growth and thereby the general purchasing power of the state, level of higher education and PM2.5 emission levels as a metric of pollution. Due to the absence of data on historical state EV prices, a synthetic price database was constructed.

Note, from here onwards 'states' refer to all Indian states and union territories altogether. All econometric analysis were performed using Stata 18 statistical software package.

2. Literature Review

2.1 Research Based on FAME Policy and EV Promotion

Sharma and Anwer (2021)[6] conducted a comparative data analysis of electric vehicle adoption across different Indian states with emphasis on the role of policy penetration. The study examined how FAME I and FAME II influenced the e-mobility initiative in India and analysed variations in adoption across states. The authors reported that the implementation of FAME-linked incentives contributed to an increase in EV adoption rates, although the intended policy targets were not fully achieved. The study further highlighted that state-level differences in policy implementation and incentives affected adoption outcomes across regions.

Das and Bhat (2022)[7] studied the implementation and policy implications of electric vehicle adoption in India within the broader context of global EV transition. Using an exploratory research approach, the study reviewed national and state-level EV policies framed by the Government of India. The authors examined policy instruments such as the National Electric Mobility Mission Plan (NEMMP) 2020, FAME-I, FAME-II, and the Vehicle Scrappage Policy. The study found that these policies facilitated incentives, infrastructure development, research and development support, production expansion, and sales promotion. The authors argued that such policy measures would strengthen EV demand generation and accelerate the transition from conventional vehicles to electric mobility. However, the study also identified limitations relating to lithium-ion battery disposal and recycling infrastructure in the Indian context.

Gulati (2022)[4] examined the role of FAME I and FAME II in supporting the electric vehicle industry in India. The study discussed the objective of FAME Phase II in accelerating electric mobility adoption and strengthening the manufacturing ecosystem in the country. The paper further noted that supportive policy measures, including FAME extensions and state-level EV policies, had an important influence on electric vehicle sales in India.

Singh et al. (2022)[8] reviewed the status of electric vehicle adoption and low-emission urban mobility in India through an assessment of FAME-I, FAME-II, and state-level initiatives. The study analysed the progress of EV adoption and evaluated the approximate reduction in CO_2 emissions in Delhi resulting from EV deployment under FAME Phase-I. The authors examined adoption barriers from the perspective of financial resources, infrastructure availability, and technological readiness. The study found that although policy measures supported EV diffusion, implementation challenges relating to charging infrastructure and financial accessibility continued to constrain large-scale adoption.

Mittal et al. (2024)[9] reviewed the technologies, challenges, and policy implications associated with electric vehicles in India. The study discussed the role of FAME-II in accelerating electric mobility adoption and promoting domestic manufacturing capabilities. The authors examined subsidy support under FAME-I and noted that several electric two-wheeler models qualified for incentives during the initial phase of implementation. The paper further observed that FAME-II, together with Public-Private Partnership (PPP) models, attempted to address charging infrastructure deficiencies through expansion of charging networks.

Ansab and Kumar (2024)[10] empirically examined the influence of government financial incentives on electric car adoption intention in India. The study analysed both the direct and indirect effects of financial incentives on consumer behaviour. Using a behavioural framework centred on attitude and Perceived Behavioural Control (PBC), the study found that government incentives indirectly influenced electric car adoption intentions through their positive effects on consumer attitudes and behavioural control perceptions. The authors also examined the moderating role of age in adoption behaviour and suggested that sustained financial incentives would strengthen long-term consumer acceptance of electric cars.

Bansal et al. (2024)[11] analysed the adoption and implementation of electric vehicle policy measures in an urban case-study setting. The study assessed the impact of FAME Phase II and state-level incentives on EV registrations and penetration rates. The authors found that the implementation of FAME Phase II led to a considerable increase in EV registrations across all vehicle categories within the study area. However, the strongest policy impact was observed in the two-wheeler and three-wheeler segments, indicating that supportive policies were more effective in relatively affordable vehicle categories.

Dwivedi et al. (2024)[12] empirically investigated the effectiveness of state-level EV incentive policies in India using static panel regression modelling techniques. The study analysed the impact of fiscal and non-fiscal policy instruments on EV diffusion. The findings indicated that purchase subsidies and scrapping incentives were more influential than several other policy measures in promoting EV adoption. The study also found that charging infrastructure support represented an important enabling factor in overcoming the high initial cost barrier associated with EVs. In addition, literacy rate emerged as a significant control variable influencing EV adoption patterns across states.

Sunanda and Parchure (2025)[13] analysed electric two-wheelers and the impact of policy instruments in Indian sub-national contexts. The study discussed the introduction of the FAME scheme following the National Electric Mobility Mission Plan (NEMMP) framework and examined the role of subsidies and policy support in improving the economic viability of electric two-wheelers. Using total cost of ownership and sensitivity analysis approaches, the authors evaluated how factors such as subsidies, fuel prices, and taxa-.tion structures influenced electric two-wheeler adoption across Indian states

Trivedi et al. (2025)[14] reviewed the effectiveness of EV subsidy policies in India over a decade. The study assessed the impact of FAME-I, FAME-II, and Production Linked Incentive (PLI) schemes across multiple vehicle segments. The findings showed that higher purchase subsidies under FAME-II significantly increased electric two-wheeler sales, indicating a strong positive policy effect in this segment. The authors further reported that FAME-II and PLI schemes contributed substantially to the growth of the commercial electric four-wheeler segment. However, the study found that electric bus adoption remained relatively modest despite subsidy support because of procurement and financ-.ing constraints

2.2 Research Based on Factors Affecting EV Adoption

Sierzchula et al. (2014)[15] analysed the influence of financial incentives and socio-economic factors on electric vehicle adoption across countries. The study examined the relationship between EV market share and variables such as charging infrastructure, local production facilities, urban density, fuel prices, education, and electricity prices. The findings showed that financial incentives, charging infrastructure, and the local presence of EV production facilities were positively associated with EV adoption, while charging infrastructure emerged as the strongest predictor among the significant variables.

Haddadian et al. (2015)[16] examined global barriers and drivers associated with electric vehicle adoption. The study identified technological, economic, behavioural, and regulatory obstacles as major constraints affecting large-scale EV deployment. The authors argued that effective regulatory frameworks should combine both push and pull policy mechanisms to reduce ownership costs, address usage barriers, and minimise risks associ-

ated with early EV adoption. The study also noted that driving patterns, charging frequency, and battery capacity significantly affected total cost of ownership.

Adnan et al. (2017)[17] reviewed theoretical framework-based research on electric vehicle consumer adoption. The study synthesised research relating to consumer perceptions, behavioural intentions, and adoption behaviour. The authors identified attitudinal factors, social norms, knowledge, perceived behavioural control, and neighbourhood effects as major determinants influencing EV adoption intention. The review also noted that technical specifications, cost comparisons, and concerns relating to limited driving range affected consumer willingness to adopt electric vehicles.

Li et al. (2017)[18] reviewed factors influencing consumer intentions to adopt battery electric vehicles and categorised these determinants into demographic, situational, and psychological dimensions. Demographic variables included age, gender, education, income, occupation, and household vehicle ownership. Situational factors included technical characteristics, environmental attributes, costs, and government policies, while psychological factors included attitudes, experience, emotions, societal influence, and perceived behavioural control. The study provided a structured framework for understanding EV adoption behaviour.

Müller (2019)[19] applied the Technology Acceptance Model (TAM) to analyse acceptance of battery electric vehicles across Europe, China, and North America. The study investigated the role of perceived usefulness, perceived ease of use, and perceived enjoyment in shaping technology acceptance. The findings showed that societal norms, environmental attitudes, individual experiences, and innovativeness significantly influenced EV acceptance. The study also identified regional differences in the relationship between perceived ease of use and perceived usefulness.

Chen et al. (2020)[20] analysed socio-demographic, behavioural, technical, and economic determinants of EV adoption in Nordic countries using survey data from Denmark, Finland, Iceland, Norway, and Sweden. The study found that younger males, higher-income individuals, households with more children, individuals with prior EV experience, and respondents possessing sustainability-oriented values were more likely to adopt EVs. Vehicle-to-grid capability and charging time were also identified as influential mobility-related attributes.

Sankaran et al. (2020)[21] examined range anxiety and consumer perceptions regarding electric vehicles in India. The study identified driving range, battery cost, inadequate charging infrastructure, and battery-related concerns as major barriers to mass EV adoption. The authors observed that consumer concerns gradually shifted from vehicle features and user experience toward battery performance, charging infrastructure, and driving range between 2016 and 2019. The study also highlighted the price-sensitive nature of the Indian automobile market.

Kumar and Chakrabarty (2020)[22] conducted a total cost of ownership analysis to assess the economic viability of electric vehicles in India. The study compared electric and internal combustion engine vehicles across different categories and analysed how daily vehicle usage influenced economic feasibility. The findings indicated that electric two-wheelers and three-wheelers exhibited lower ownership costs per kilometre compared to conventional alternatives, whereas electric cars and buses remained relatively less competitive. The study further emphasised the importance of financial incentives, innovative financing models, and charging infrastructure planning in accelerating EV adoption.

Chhikara et al. (2021)[23] conducted an exploratory study on factors affecting electric vehicle adoption in India. The study identified government support for research and development, together with financial and non-financial incentives, as major drivers of EV adoption. At the same time, the authors identified poor charging infrastructure, technical limitations, high manufacturing costs arising from raw material imports, and insufficient legislative support as key barriers. The study also suggested that awareness campaigns, industry-academia collaboration, and continuous improvement in vehicle performance could facilitate successful EV transition.

Kore and Koul (2022)[24] studied the status and positioning of electric vehicle charging infrastructure in India. The study identified multiple challenges affecting charging infrastructure deployment, including high costs, inadequate charging availability, imported battery dependence, range anxiety, and weak local incentive structures. The authors argued that charging infrastructure deployment represented a decisive factor in accelerating EV adoption and discussed the role of government policy support in expanding infrastructure networks.

KV et al. (2022)[25] analysed factors influencing electric vehicle adoption in India using survey data collected from 172 respondents in Bengaluru. The study identified six major determinants of EV adoption intention, namely financial barriers, vehicle performance barriers, lack of charging infrastructure, environmental conservation, societal influence, and social awareness. The findings showed that financial barriers, vehicle performance concerns, and inadequate charging infrastructure were the most influential constraints affecting adoption behaviour in the Indian context.

Patil (2024)[26] analysed socio-economic and demographic determinants affecting electric vehicle growth in India. The study used variables such as population density, petrol prices, per capita income, GDP, diesel prices, and average household electricity consumption to explain EV growth patterns. The findings indicated that GDP, per capita income, and population density were positively associated with EV growth, while electricity prices and diesel prices exhibited negative relationships. The study used the total income of ten major Indian EV manufacturing firms as a proxy for EV growth.

Yadav and Yadav (2024)[27] examined barriers and motivators associated with electric vehicle adoption among Indian consumers. The study identified subsidies, environmental self-image, environmental concern, and trend-following behaviour as major motivators supporting EV adoption. Conversely, the study found that trust deficits, inadequate charging infrastructure, range anxiety, and high upfront costs acted as significant barriers. The authors further reported that personal values, social values, and environmental knowledge significantly shaped consumer attitudes and adoption intentions.

Kant et al. (2024)[28] analysed the relationship between socio-psychological attributes, fiscal incentives, socio-demographic factors, adoption intention, and willingness to pay for electric vehicles in India. The study examined variables such as subjective norms, personal norms, affective attitudes, perceived knowledge, gender, education, and income. The findings showed that these socio-psychological and socio-demographic factors directly influenced both adoption intention and willingness to pay. However, fiscal incentives were not found to have a statistically significant relationship with willingness to pay.

Pamidimukkala et al. (2024)[29] conducted a global review of barriers and motivators influencing EV adoption through an examination of 537 studies. The authors classified determinants into contextual, situational, demographic, and psychological categories. The review identified inadequate charging infrastructure and limited driving range as the most frequently cited barriers, while reduced air pollution and policy incentives emerged as the most common motivators encouraging EV adoption.

Piñas et al. (2025)[30] examined EV market dynamics through a multi-agent modelling framework involving consumers, energy companies, and government stakeholders. The study analysed how policy incentives, charging infrastructure expansion, charging speed, and charging station availability influenced EV adoption. The findings indicated that improvements in charging infrastructure and user experience facilitated broader EV adoption, while economic disparities affected the retention and adoption of different vehicle types.

Ye et al. (2025)[31] analysed electric vehicle transitions through the framework of system logics and asymmetric power dynamics. Using comparative analysis across the United States, Germany, China, and Thailand, the study found that industrial maturity, policy coherence, infrastructure availability, cultural norms, and institutional conditions significantly influenced EV transition pathways. The authors also argued that widespread EV adoption depended on strategic market development and supportive institutional environments.

Mustafa et al. (2026)[32] examined the role of environmental awareness and self-identification expressiveness within a value-based technology adoption framework. The study integrated these dimensions into the analysis of EV adoption intention and found that

perceived benefits and perceived sacrifices significantly shaped perceived value, which subsequently influenced adoption intentions. The findings further confirmed that environmental awareness represented a significant predictor of EV adoption, although it was .not identified as the most dominant factor

3. Research Gap

In spite of extensive research done in the domain of EV adoption and Indian EV policies, several gaps remain evident in the literature.

Much of the Indian EV literature relies on consumer perception surveys, behavioural intention models, or conceptual policy reviews rather than state-level empirical analyses using actual adoption data. Other studies, although theoretically discuss adoption, do not actually delve into analysis of how macroeconomic and cost-related variables influence EV sales across Indian states over time. These studies primarily focus on willingness to buy and not actual sales, with limited integration of economic affordability variables such as vehicle prices, fuel prices, electricity costs, and income indicators within a unified empirical framework. In cases where sales are taken into account, the methodology primarily deals with Total Cost of Ownership (TCO) or current ex-showroom or on-road prices. There are very few, if not none, that have attempted to construct a historical price data panel for any type of automobiles across Indian states, more specifically EVs.

Although studies such as Sierzchula et al. (2014)[15] and Patil (2024)[26] identified infrastructure, fuel prices, income, and electricity costs as influential factors, limited research has simultaneously incorporated environmental variables, socio-economic indicators, and vehicle affordability measures in the Indian context. The interaction between these variables across vehicle categories as well as different policy regimes remains underexplored since most existing studies treat electric vehicles as a homogeneous category, whereas adoption dynamics differ substantially across two-wheelers, three-wheelers, four-wheelers, and buses and obviously across different policy periods.

Accordingly, the present study attempts to address these gaps by constructing a state-wise empirical dataset for India across multiple policy-based time periods and examining the relationship between EV adoption and variables such as on-road vehicle prices, fuel prices, electricity costs, income levels, education indicators, pollution levels, and infrastructure-related factors across different vehicle categories.

4. Objective

The main objective of this paper is to perform an inter-state analysis to estimate the effects of purely economic (on-road price of EVs, fuel cost, electricity cost), socio-economic (per capita income and education) and environmental (air pollution) factors on

private EV adoption (2w and 4w) across three different time periods (2014-15, 2018-19, 2021-22) with respect to the FAME policy phases in India.

5. Data

The following table shows the list of secondary data that was collected and used for econometric analysis. Each data corresponds to the three study periods: FY 2014-15, 2018-19 and 2021-22.

State-wise Data	Abbreviated Variable Name	Description and Source
Dependent Variables:		
Sales of 2-wheeler EVs	sales2w	Private EV 2-wheeler (non-transport) registrations as per Vahan Dashboard[33]
Sales of 4-wheeler EVs	sales4w	Private EV 2-wheeler (non-transport) registrations as per Vahan Dashboard[33]
Independent Variables:		
On-road synthetic price of 2-wheeler EVs	p2w	Calculated by authors (under assumptions) based on historical prices on car portals, tax data based on Road Transport Yearbooks[34] (MoRTH), subsidy data from state EV policies and Climate Trends Report[35]. Methodology discussed later.
On-road synthetic price of 4-wheeler EVs	p4w	
PCNSDP (income)	pci	Handbook of Statistics on Indian Economy, RBI[36]
Fuel price (petrol)	pfuel	Indiastat[37]
Fuel price (composite petrol/diesel)	pdfuel	Calculated by authors using Indiastat[37] data
PM2.5 (population-adjusted)	poll	Population-weighted PM2.5 estimates for India were obtained from the satellite-derived surface PM2.5 database[38] developed by the Atmospheric Composition Analysis Group at Washington University in St. Louis (van Donkelaar et al., 2021[39]).
Higher-education student pass-outs	edu	Total number of pass-outs/out-turns across all higher education categories as per AISHE[40] reports

Electricity cost (per kWh)	elec	Average monthly electricity slab rate (paisa per kWh consumption) for urban household consuming less than 600 kWh electricity per month obtained from CEA Tariff Database[41]

6. Methodology

6.1 Data adjustments and variable construction

The analysis was carried out on a state/Union Territory-level dataset for India. Because the sample is small and the units are heterogeneous, the cleaning strategy was designed to preserve as many usable state-year observations as possible rather than allowing listwise deletion to remove cases with only a single missing cell. Missing sales values in the early EV period were treated as zero registrations. To normalise the huge scale gap between high adoption and low adoption states as well as to retain the zero-sales observations in the estimation sample, the dependent variable was transformed as ln (sales + 1). This follows the general statistical practice of using logarithmic transformations to reduce skewness and stabilize variance, while handling zero outcomes with a log-plus-one form rather than a plain logarithm (Yang, 2012)[42]

Missing predictor values for fuel and electricity prices were handled through transparent donor-state substitution. This was a deliberate data-completion step, not a claim that the donor and recipient states have identical prices. The broader logic is consistent with hot-deck or donor imputation, where missing values are replaced with observed values from similar units chosen within an imputation cell. In a small cross-sectional dataset, this approach is often preferable to dropping observations wholesale, provided the substitutions are clearly documented (Park & Young, 2022)[43]

The donor choices were made on simple geographic and administrative grounds. Telangana in 2014–15 was matched to Andhra Pradesh because Telangana was created under the Andhra Pradesh Reorganisation Act, 2014, so Andhra Pradesh was the closest administrative reference point in the transition year (The Andhra Pradesh Reorganisation Act, 2014)[44].

For the North-Eastern states with missing fuel-price observations, Assam was used as the donor because the Government of Assam's logistics policy explicitly describes Assam as a regional logistics hub, which makes it the most natural regional reference state for the surrounding North-Eastern area (Assam Logistics and Warehousing Policy, 2022)[45].

Lakshadweep was matched to Kerala because the Lakshadweep administration states that the islands are reached by ships and flights operated from Kochi and that Kochi is the gateway to Lakshadweep. That makes Kerala the most direct mainland reference for this territory (Lakshadweep State Govt.)[46].

Dadra and Nagar Haveli and Daman and Diu were matched to Gujarat because the official district website states that Dadra is surrounded by Gujarat and that the territory lies on the border of Gujarat and Maharashtra. This made Gujarat a straightforward neighbouring-state donor for missing price observations. (Dadra & Nagar Haveli District Govt.)[47].

State-wise fuel price data were primarily obtained from IndiaStat[38]. One missing 2018 observation was imputed using annualized averages constructed from monthly retail fuel price data obtained from an online Indian fuel price depository named PetrolDieselPrice.[48]

In the two-wheeler models, petrol price was used as the relevant fuel benchmark. In the four-wheeler models, a simple average of petrol and diesel prices was used to avoid putting two highly related fuel variables into the same regression and to retain a single fuel-cost proxy.

State per-capita income and synthetic on-road EV price were entered in natural logarithms so that their coefficients could be read in elasticity terms, while fuel and electricity cost variables were kept in levels so that they remained directly interpretable in rupee terms. The number of higher education student pass-out data was heavily skewed and dispersed, hence natural logarithm was considered in this case too. This is a standard mixed log specification: the logged variables capture relative changes, while the level variables preserve the original unit meaning of the regressors (Yang, 2012)[42].

6.2 Construction of the synthetic price panel

Since data on historical on-road prices of electric vehicles for Indian states is not available, the authors constructed a synthetic price database for the three years. The methodology designed was based on this logic:

where:

6.3 Model specifications

The approach of this paper is simple. Two vehicle categories and three different policy years were considered; hence six separate cross-sectional ordinary least squares

$$P_{onroad} = [(P_{raw} - S_{Central})(1 + T_{tax})][1 + (R_{tax}(1 - W_{RT}))] + F_{reg} - S_{State}$$

(OLS) regressions were estimated. The model specifications are as follows:

P_{raw} = price without any taxes (based on benchmark model assumption: the price of the highest sold EV model by the OEM with the highest sales as per Vahan records for each vehicle category and each chosen time-periods)
$S_{central}$ = Central Govt Subsidy as per FAME policies
T_{tax} = VAT/GST Rate
R_{tax} = Road Tax Rate % obtained from Road Transport Yearbook, MoRTH
W_{RT} = Road Tax Waiver % (As per state EV policy or incentives)
F_{reg} = Registration Fee (assumed Rs. 500 for 2w, Rs. 1000 for all three periods)
S_{state} = State Subsidy (As per state EV policy or incentives)

Net Base Price (NBP) = $(P_{raw} - S_{central})$
Ex-showroom Price: $P_{ex\text{-}show} = \text{NBP} \times (1 + T_{tax})$
Road Tax Paid = $P_{ex\text{-}show} \times R_{tax} \times (1 - W_{RT})$

Let denote the states.
2W regression models:

Null and alternative hypotheses:

Based on economic rationale, the expected coefficient signs are listed in Table 3.

$$\ln(\text{sales2w}_{i,14\text{-}15} + 1) = \alpha_1 + \beta_{11} \ln p\,2w_{i,14\text{-}15} + \beta_{12}\, elec_{i,14\text{-}15} + \beta_{13}\, pfuel_{i,14\text{-}15} + \beta_{14} \ln edu_{i,14\text{-}15} + \beta_{15}\, poll_{i,14\text{-}15} + \beta_{16} \ln p\, ci_{i,14\text{-}15} + \varepsilon_{i,14\text{-}15} \quad \text{(i)}$$

$$\ln(\text{sales2w}_{i,18\text{-}19} + 1) = \alpha_2 + \beta_{21} \ln p\,2w_{i,18\text{-}19} + \beta_{22}\, elec_{i,18\text{-}19} + \beta_{23}\, pfuel_{i,18\text{-}19} + \beta_{24} \ln edu_{i,18\text{-}19} + \beta_{25}\, poll_{i,18\text{-}19} + \beta_{26} \ln p\, ci_{i,18\text{-}19} + \varepsilon_{i,18\text{-}19} \quad \text{(ii)}$$

$$\ln(\text{sales2w}_{i,21\text{-}22} + 1) = \alpha_3 + \beta_{31} \ln p\,2w_{i,21-22} + \beta_{32}\, elec_{i,21-22} + \beta_{33}\, pfuel_{i,21-22} + \beta_{34} \ln edu_{i,21-22} + \beta_{35}\, poll_{i,21-22} + \beta_{36} \ln p\, ci_{i,21-22} + \varepsilon_{i,21-22} \quad \text{(iii)}$$

4W regression models:

$$\ln(\text{sales4w}_{i,14\text{-}15} + 1) = \gamma_1 + \delta_{11} \ln p\,4w_{i,14\text{-}15} + \delta_{12}\, elec_{i,14\text{-}15} + \delta_{13}\, pdfuel_{i,14\text{-}15} + \delta_{14} \ln edu_{i,14\text{-}15} + \delta_{15}\, poll_{i,14\text{-}15} + \delta_{16} \ln p\, ci_{i,14\text{-}15} + \upsilon_{i,14\text{-}15} \quad \text{(iv)}$$

$$\ln(\text{sales4w}_{i,18\text{-}19} + 1) = \gamma_2 + \delta_{21} \ln p\,4w_{i,18\text{-}19} + \delta_{22}\, elec_{i,18\text{-}19} + \delta_{23}\, pdfuel_{i,18\text{-}19} + \delta_{24} \ln edu_{i,18\text{-}19} + \delta_{25}\, poll_{i,18\text{-}19} + \delta_{26} \ln p\, ci_{i,18\text{-}19} + \upsilon_{i,18\text{-}19} \quad \text{(v)}$$

$$\ln(\text{sales4w}_{i,21\text{-}22} + 1) = \gamma_3 + \delta_{31} \ln p\,4w_{i,21\text{-}22} + \delta_{32}\, elec_{i,21\text{-}22} + \delta_{33}\, pdfuel_{i,21\text{-}22} + \delta_{34} \ln edu_{i,21\text{-}22} + \delta_{35}\, poll_{i,21\text{-}22} + \delta_{36} \ln p\, ci_{i,21\text{-}22} + \upsilon_{i,21\text{-}22}$$

4W regression models:

$$\ln(\text{sales4w}_{i,14\text{-}15}+1)=\gamma_1+\delta_{11}\ln p4w_{i,14\text{-}15}+\delta_{12}\,elec_{i,14\text{-}15}+\delta_{13}\,pdfuel_{i,14\text{-}15}+\delta_{14}\ln edu_{i,14\text{-}15}+\delta_{15}\,poll_{i,14\text{-}15}+\delta_{16}\ln pci_{i,14\text{-}15}+v_{i,14\text{-}15} \quad \text{(iv)}$$

$$\ln(\text{sales4w}_{i,18\text{-}19}+1)=\gamma_2+\delta_{21}\ln p4w_{i,18\text{-}19}+\delta_{22}\,elec_{i,18\text{-}19}+\delta_{23}\,pdfuel_{i,18\text{-}19}+\delta_{24}\ln edu_{i,18\text{-}19}+\delta_{25}\,poll_{i,18\text{-}19}+\delta_{26}\ln pci_{i,18\text{-}19}+v_{i,18\text{-}19} \quad \text{(v)}$$

$$\ln(\text{sales4w}_{i,21\text{-}22}+1)=\gamma_3+\delta_{31}\ln p4w_{i,21\text{-}22}+\delta_{32}\,elec_{i,21\text{-}22}+\delta_{33}\,pdfuel_{i,21\text{-}22}+\delta_{34}\ln edu_{i,21\text{-}22}+\delta_{35}\,poll_{i,21\text{-}22}+\delta_{36}\ln pci_{i,21\text{-}22}+v_{i,21\text{-}22} \quad \text{(vi)}$$

Table 2: Expected coefficient signs and rationale

For the 2W Models $H_0: \beta_{1j}=0 \quad H_0: \beta_{2j}=0 \quad H_0: \beta_{3j}=0$
H_1: For each i = 1,2,3 at least one $\beta_{ij} \neq 0$ *where* $j = 1,2,\ldots,6$

For the 4W Models $H_0: \delta_{1j}=0 \quad H_0: \delta_{2j}=0 \quad H_0: \delta_{3j}=0$
H_1: For each i = 1,2,3 at least one $\delta_{ij} \neq 0$ *where* $j = 1,2,\ldots,6$

Variable	Expected sign	Rationale
lnp2w, lnp4w	Negative	Higher EV price raises purchase cost and reduces demand.
elec		Higher electricity/charging cost raises operating cost, reducing EV adoption.
pfuel	Positive	Higher petrol price makes EVs relatively more attractive for 2W.
pdfuel		Higher diesel price raises ICE operating cost, increasing 4W EV attractiveness.
lnedu		Higher education usually proxies awareness, human capital development and openness to new technology, and environmental sensitivity.
poll		Higher pollution exposure can increase preference for cleaner EVs.
lnpci		Higher per-capita income increases ability to afford higher upfront EV cost.

Source: Authors' opinions

7. Results & Analysis

7.1. The following tables show the descriptive statistics of the study variables in their original format, prior to any transformation, arranged in year-wise sections:

Table 3a: Descriptive Statistics (2014–15)

Variable	Obs.	Mean	Std. Dev.	Min	Median	Max
Petrol Price	34	62.04	3.11	53.54	61.63	66.69
Diesel Price	34	51.46	2.35	47.65	51.12	55.44
Electricity Cost	35	507.59	170.76	213.00	514.00	847.00
Education Pass-outs	35	252225.00	360595.30	62.00	129162.00	1789024.00
PM2.5	35	41.81	17.73	22.20	37.00	99.40
PCNSDP	33	94031.88	51162.96	23223.00	91034.00	241081.00
On-road Price (2W EV)	35	55084.32	2876.02	48950.00	56609.38	59782.38
On-road Price (4W EV)	35	785364.00	41727.09	708200.00	804250.00	857460.00
EV Sales (2W)	35	43.09	136.61	0.00	1.00	787.00
EV Sales (4W)	35	18.89	72.52	0.00	1.00	425.00
Fuel Cost Proxy (4W)	34	56.75	2.43	52.73	56.25	61.01

Table 3b. Descriptive Statistics (2018–19)

Variable	Obs.	Mean	Std. Dev.	Min	Median	Max
Petrol Price	34	69.63	3.55	60.47	69.49	75.48
Diesel Price	34	64.47	2.70	59.19	64.51	69.37
Electricity Cost	35	587.17	176.13	208.00	560.00	925.00
Education Pass-outs	35	259745.00	334207.90	129.00	167887.00	1529193.00
PM2.5	35	45.96	20.03	19.80	41.80	113.50
PCNSDP	33	121147.50	66341.97	29092.00	115592.00	308753.00
On-road Price (2W EV)	35	62761.46	1733.59	54860.00	028.00	65202.40
On-road Price (4W EV)	35	1138275.00	35768.01	984040.00	1138192.00	1214005.00
EV Sales (2W)	35	769.29	1210.42	0.00	119.00	4883.00
EV Sales (4W)	35	36.49	80.51	0.00	4.00	363.00
Fuel Cost Proxy (4W)	34	67.05	2.88	60.24	67.10	71.73

Table 3c. Descriptive Statistics (2021–22)

Variable	Obs.	Mean	Std. Dev.	Min	Median	Max
Petrol Price	35	99.45	6.26	82.96	98.50	111.10
Diesel Price	35	87.22	5.25	77.13	86.80	96.55
Electricity Cost	35	638.66	199.64	251.00	615.00	1019.00
Education Pass-outs	35	306801.10	385388.80	26.00	201517.00	1637026.00
PM2.5	35	42.03	16.94	17.20	39.20	103.40
PCNSDP	33	122825.60	64282.05	27674.00	118349.00	294563.00
On-road Price (2W EV)	35	54846.39	6731.18	29942.50	57664.62	59842.32
On-road Price (4W EV)	35	1436373.00	74696.56	1249600.00	1469530.00	1567432.00
EV Sales (2W)	35	7141.63	11207.49	0.00	1899.00	41899.00
EV Sales (4W)	35	505.89	1174.53	0.00	77.00	6381.00
Proxy (4W)	35	93.34	5.52	80.05	92.04	103.51

Source: Authors calculations based on secondary data

Note: Fuel Cost Proxy (4W) represents the average of petrol and diesel prices used for the four-wheeler EV affordability model.

7.2 Correlation Analysis and Pre-Regression Diagnostics

Before estimating the multivariate linear regressions, pairwise correlation analysis was carried out for each of the three financial years, namely 2014-15, 2018-19, and 2021-22, separately for the two-wheeler and four-wheeler segments. The correlation matrices, reported in Tables 4A and 4B serve as an initial diagnostic step. They help identify the raw linear relationships between the dependent and independent variables.

Table 4A: Correlation matrix between dependent and independent variables used in 2W regression models

Independent Variables FY 2014-15	Correlation coefficient with ln_sales_2w14
ln_onroad_2w14	-0.0719

Independent Variables FY 2018-19	Correlation coefficient with ln_sales_2w18
ln_onroad_2w18	-0.1068

Independent Variables FY 2021-22	Correlation coefficient with ln_sales_2w21
ln_onroad_2w21	-0.3099

ln_pcnsdp14	-0.0283	ln_pcnsdp18	-0.1994	ln_pcnsdp21	-0.0348
petrol14	0.2952	petrol18	*0.4361	petrol21	*0.3976
pm25_14	0.2910	pm25_18	*0.5111	pm25_21	*0.4239
ln_edu14	*0.6675	ln_edu18	*0.8132	ln_edu21	*0.7826
elec_cost14	*0.4126	elec_cost18	*0.5307	elec_cost21	*0.3886

Table 4B: Correlation matrix between dependent and independent variables used in 4W regression models

Independent Variables FY 2014-15	Correlation coefficient with ln_sales_2w14	Independent Variables FY 2018-19	Correlation coefficient with ln_sales_2w18	Independent Variables FY 2021-22	Correlation coefficient with ln_sales_2w21
ln_onroad_4w14	0.0514	ln_onroad_4w18	-0.0561	ln_onroad_4w21	*-0.3902
ln_pcnsdp14	0.1599	ln_pcnsdp18	0.2562	ln_pcnsdp21	0.2099
fuel14	0.2799	fuel18	0.2973	fuel21	*0.4278
pm25_14	0.2398	pm25_18	0.2837	pm25_21	*0.3363
ln_edu14	*0.5434	ln_edu18	*0.5686	ln_edu21	*0.6920
elec_cost14	*0.4193	elec_cost18	*0.4500	elec_cost21	*0.4039

Source for Tables 4A & 4B: Authors' calculations

*Note: * indicates significance at 5% level.*

A clear pattern that emerges across all six matrices is the exceptionally strong and positive association between electric vehicle sales and logged education proxy. In the two-wheeler segment, the log of education shows a robust, statistically significant correlation with sales across all periods, starting at 0.6675 in 2014-15, leaping sharply to 0.8132 in 2018-19, and remaining high at 0.7826 in 2021-22. A matching upward trend is visible in the four-wheeler segment, where the correlation between sales and logged education moves from 0.5434 in the first period to 0.5686 in the second, and culminates at 0.6920 by the final period. The application of the logarithmic transformation clearly amplifies the visible raw connection between human capital and sales over time. This supports the concept that states with an expanding base of higher education enrolment show a greater baseline affinity for adopting technology-intensive products.

In contrast to education, state per capita income demonstrates complete statistical neutrality in the raw pairwise correlation framework. For two-wheelers, the correlation coefficients hover near zero or turn slightly negative, while for four-wheelers, the values remain weak and statistically insignificant across all studied years, tracking at 0.1599 in

2014-15, 0.2562 in 2018-19, and 0.2099 in 2021-22. This persistent insignificance does not imply that income is irrelevant to the adoption process. Rather, it indicates that the true impact of macro wealth is masked by overlapping state characteristics in simple bivariate settings, highlighting that its structural role only surfaces clearly once other parameters are controlled for in a multi-variable regression. Concurrently, the logged on-road price variable shows an expected negative movement as the market matures. While it remains weak in the early periods, by 2021-22 the price correlation shifts to a noticeable -0.3099 for two-wheelers and becomes statistically significant at -0.3902 for four-wheelers, capturing an emerging purchase price demand constraint in the later phases of the market.

The relationships between sales and contextual factors like running costs and ambient pollution also show clear temporal shifts. For two-wheelers, petrol price correlations are insignificant in the initial period but turn significantly positive at 0.4361 in 2018-19 and 0.3976 in 2021-22. In the four-wheeler segment, fuel price follows a delayed but identical pattern, establishing a significant positive correlation of 0.4278 only by the final period. This indicates that consumer sensitivity to conventional fuel costs became visible in the raw data only after local EV markets achieved commercial relevance. Ambient air pollution follows a similar path. The correlation between PM2.5 and sales begins as weak and insignificant, but turns statistically significant over time, reaching 0.4239 for two-wheelers and 0.3363 for four-wheelers by 2021-22. This trend suggests that environmental degradation became a more visible indicator of adoption as public awareness and market options expanded.

7.2 Regression results

The following tables summarize the regression results of the six models specified previously.

Table 5.1: OLS Regression Results for Electric Two-Wheeler (2W) Adoption Across Indian States

Dependent Variable: Log Sales 2W	Coefficient for year:		
Independent Variables:	2014–15	2018–19	2021–22
Log On-road Price	-2.176	-6.523	-0.471
	(5.582)	(11.263)	(2.901)
Log Per Capita NSDP	0.288	-0.102	0.754
	(0.518)	(0.625)	(0.827)
Petrol Price	-0.215	-0.043	-0.080
	(0.134)	(0.102)	(0.092)

PM2.5	-0.017	0.013	-0.008
	(0.017)	(0.018)	(0.028)
Log Education	1.041***	1.222***	2.036***
	(0.227)	(0.267)	(0.385)
Electricity Cost	0.002	0.001	-0.001
	(0.002)	(0.002)	(0.003)
Constant	23.683	65.985	-11.937
	(63.013)	(127.444)	(36.463)
Observations	32	33	33
R-squared	0.565	0.694	0.692
Adjusted R-squared	0.460	0.623	0.621
F-statistic	5.40***	9.81***	9.74***
Root MSE	1.425	1.715	2.281
Robust SE Used	No	No	No

Source: Authors' calculations

Notes: Entries are coefficients with standard errors in parentheses. All specifications are OLS regressions. Standard errors in parentheses.
**** p < 0.01, ** p < 0.05, * p < 0.10.*

Table 5.2 : OLS Regression Results for Electric Four-Wheeler (4W) Adoption Across Indian States

Dependent Variable: Log Sales 4W	Coefficient for year:		
Independent Variables:	2014–15	2018–19	2021–22
Log On-road Price	0.730	10.856	-0.484
	(5.280)	(8.297)	(6.545)
Log Per Capita NSDP	0.820*	1.949***	1.998***
	(0.398)	(0.514)	(0.670)
Fuel Price	-0.197	-0.103	-0.039
	(0.137)	(0.107)	(0.088)
PM2.5	-0.011	-0.014	-0.008
	(0.017)	(0.015)	(0.022)
Log Education	0.727***	0.679***	1.200***
	(0.214)	(0.235)	(0.327)

Electricity Cost	0.002*	0.005**	0.002
	(0.001)	(0.002)	(0.002)
Constant	-15.757	-175.157	-23.680
	(73.501)	(117.047)	(96.051)
Observations	32	33	33
R-squared	0.501	0.565	0.643
Adjusted R-squared	—	0.464	0.561
F-statistic	8.76***	5.62***	7.80***
Root MSE	1.221	1.402	1.779
Robust SE Used	Yes	No	No

Source: Authors' calculations

Notes: Entries are coefficients with standard errors in parentheses. All specifications are OLS regressions. Standard errors in parentheses.
**** $p < 0.01$, ** $p < 0.05$, * $p < 0.10$.*

7.3 Interpretation of Results

Electric Two-Wheelers (Table 5.1)

- Log Education: This variable is the only independent factor that exhibits statistical significance at the 1 percent level across all three time periods. In the 2014-15 period, a 1 percent increase in the state-level education metric leads to a 1.041 percent increase in electric two-wheeler sales. This responsiveness amplifies over time, with a 1 percent increase in education resulting in a 1.222 percent increase in sales during 2018-19, and peaking at a 2.036 percent increase by 2021-22.
- Log Per Capita NSDP and Electricity Cost: Unlike the four-wheeler segment, none of these variables exhibit any statistically significant effect on electric two-wheeler sales.

Electric Four-Wheelers (Table 5.2)

- Log Education: Similar to the two-wheeler segment, this factor remains positive and statistically significant at the 1 percent level across all observed years. A 1 percent increase in education corresponds to a 0.727 percent increase in four-wheeler sales in 2014-15, a 0.679 percent increase in 2018-19, and a 1.200 percent increase in 2021-22.
- Log Per Capita NSDP: Unlike the two-wheeler segment, macroeconomic wealth is a significant determinant for four-wheelers. In 2014-15, the variable is statistically significant at the 10 percent level with a coefficient of 0.820. In the subsequent periods of 2018-19 and 2021-22, the factor becomes highly significant

at the 1 percent level, with the elasticity rising to 1.949 and 1.998, respectively. This demonstrates that by the final period, a 1 percent increase in state per capita income corresponds to an approximate 2 percent increase in sales.

- Electricity Cost: This variable displays minor statistical significance in the early years, carrying a coefficient of 0.002 at the 10 percent level in 2014-15 and 0.005 at the 5 percent level in 2018-19. By 2021-22, the impact becomes statistically insignificant.

Insignificance of Other Factors:

Standard demand factors Log On-road Price, Petrol Price and environmental factor air pollution (PM2.5 level) fail to achieve statistical significance in any of the six regression models across three time-periods and both vehicle categories, indicating a general lack of explanatory power for these variables in the registered two-wheeler and four-wheeler EV segment.

Model Fit, Diagnostics, and Multicollinearity

Model Fit: The overall explanatory power of the models improves over the years. For electric two-wheelers, the adjusted R-squared value advances from 0.460 in 2014-15 to 0.621 in 2021-22. For electric four-wheelers, the adjusted R-squared reaches 0.561 by the final period. The F-statistic is statistically significant at the 1 percent level across all six individual regressions, confirming the joint validity of the chosen independent variables.

Robust Standard Errors: Robust standard errors were utilized exclusively for the 2014-15 electric four-wheeler regression. This approach was necessitated because the specific model failed the Breusch-Pagan test for homoskedasticity, indicating the presence of mild heteroskedasticity. The remaining five regression models successfully passed the Breusch-Pagan diagnostic test, justifying the application of standard ordinary least squares errors.

Multicollinearity: Diagnostic testing for multicollinearity was executed via the Variance Inflation Factor test in Stata. All individual variable scores as well as the overall mean scores across all six regressions were established below the value of 5, indicating that .multicollinearity does not distort the stability or reliability of the estimated coefficients

7.3 Analysis

The Dominance of Human Capital and the Total Cost of Ownership Narrative

The most striking finding across both tables is the persistent and growing significance of the education variable. In economic theory, education serves as a direct proxy for human capital. This capital operates through two distinct channels to drive electric vehicle adoption.

First, higher levels of education correlate with increased labour productivity and higher long-term earning potential. This creates a specific segment of forward-looking households with the financial capacity to invest in modern consumer durables. This explains why the education variable outshines broad state wealth metrics like per capita income in the two-wheeler segment. Broad macroeconomic wealth can be skewed by localized industrial or mining outputs, whereas the education metric directly captures the concentration of productive, household-level buyers.

Second, the structural shift in the education coefficients over time highlights an information and analytical barrier. Electric vehicles present a novel technology that requires a departure from traditional consumer habits. An electric vehicle's primary financial incentive is not upfront price parity, but rather its long-term running cost savings and lower total cost of ownership. Calculating these savings requires consumers to compute complex trade-offs involving battery degradation, utility electricity tariffs, daily commuting distances, and future fuel price paths.

The empirical results suggest that educated individuals are more capable of performing these analytical calculations independently rather than relying purely on commercial showroom sales pitches. In the early years of 2014-15, high-speed electric vehicle adoption also carried significant technical risks, such as battery fires, range anxiety, and non-existent roadside assistance. Overcoming these institutional and psychological hurdles required a specific demographic profile characterized by high tech exposure, information symmetry, and a willingness to adopt risky new technologies, traits heavily concentrated among educated and younger populations. As the market progressed into the FAME II era of 2021-22, this awareness requirement intensified, causing the education coefficient to climb to 2.036 for two-wheelers and 1.200 for four-wheelers.

The Structural Divergence Between Two-Wheeler and Four-Wheeler Markets

The sharp contrast in the significance of state-level income between the two vehicle segments reveals a deep structural division in consumer behaviour. For electric two-wheelers, the income variable remains entirely insignificant across all three periods. This indicates that two-wheelers in India function strictly as mass-market utility commodities. Consumers purchase them out of necessity for daily commuting and economic productivity. Consequently, the adoption of an electric two-wheeler is driven by localized operational advantages rather than the overall macroeconomic wealth of a state.

Conversely, the four-wheeler market exhibits a highly income-elastic structure. The income coefficient is significant at the 10 percent level in 2014-15 at 0.820, and then expands significantly to 1.949 in 2018-19 and 1.998 in 2021-22 at the 1 percent level. This strong elasticity indicates that electric four-wheelers were treated strictly as discretionary luxury items or secondary household vehicles during these periods. The entry barrier for

an electric four-wheeler was exceptionally high, with early options targeting premium segments. Therefore, sales naturally concentrated within wealthy states capable of absorbing these high capital outlays. The doubling of the coefficient by 2021-22 proves that as the commercial passenger vehicle market expanded, adoption became even more tightly locked behind state-level wealth barriers.

The Price Elasticity Paradox and the Registration Filter

Standard economic theory dictates that a higher on-road price should yield a negative and statistically significant coefficient. However, the log on-road price variable remains statistically insignificant across all six regression models. This paradox can be explained by a structural data filter and market segmentation.

The database utilized for this study relies strictly on official state vehicle registries, meaning it captures only road-legal, high-speed vehicles that require formal registration, licenses, and third-party insurance. In the Indian two-wheeler ecosystem, a massive parallel market exists for unregistered, low-speed electric scooters. This low-speed segment is characterized by low-cost, imported kits assembled locally by small enterprises, offering highly price-elastic options to budget-conscious buyers.

Because these low-speed models do not enter the official registry data, the highly price-sensitive consumer segment is completely omitted from the dependent variable sample. The remaining registry sample consists entirely of premium, high-speed, sophisticated models from established brands. The consumers purchasing these registered models are paying a substantial premium for performance, digital features, and manufacturing reliability. This specific target audience is inherently price-inelastic, which explains why marginal variations in the synthetic on-road price variable fail to register any statistically significant impact.

Temporal Shifting and the FAME Policy Footprint

The chronological movement of the coefficients maps closely onto the evolution of India's policy framework, specifically highlighting a structural mismatch between policy targets and the vehicle segments tracked in this study. The only variable across six regression models that completely internalises FAME's effect is the synthetic on-road price. Although it came out insignificant in all the models, which can be credited to the absence of a long-term continuous panel data to observe dynamic changes, the broader picture can be addressed in a different way.

The 2014-15 period serves as a pre-policy baseline where the market was fundamentally non-existent for four-wheelers. The minor significance observed in that period does not reflect organic consumer demand, but rather manufacturer-driven distribution choices. During 2014-15, manufacturers restricted electric four-wheeler sales strictly to

specific metro hubs like Bangalore, Delhi, and Mumbai due to the need for specialized high-voltage service infrastructure. Therefore, the early coefficients merely reflect the fact that corporate distribution networks were placed in states that happened to have baseline wealth and literacy.

By 2018-19, corresponding with the FAME I era, the market shifted toward institutional procurement. The four-wheeler landscape was dominated by fleet vehicles allocated to government departments via centralized tenders, centering sales around political and administrative hubs. This artificial allocation overrode standard market demand mechanisms, contributing to the continued insignificance of price and fuel variables.

This policy distortion intensified dramatically during the 2021-22 period under the FAME II framework. While FAME II massively expanded the overall EV budget, the central government deliberately restricted four-wheeler demand incentives exclusively to commercial vehicles, public transport, and shared mobility fleets. Private passenger four-wheelers were completely cut off from central subsidies (Ministry of Heavy Industries, GOI, 2019)[49]

Because the dataset in this study is strictly restricted to registered private vehicles, the results capture a market segment that received zero policy cushioning against the high upfront costs of modern four-wheeler electric vehicles. This institutional restriction explains why the four-wheeler income coefficient remained stubbornly fixed at a very high level of 1.998 in 2021-22. Private four-wheeler adoption remained heavily locked behind the wealth barrier of high-income states because the policy framework actively denied subsidies to private buyers, while the price variable remained completely insignificant.

Conversely, for the two-wheeler market, FAME II retained demand incentives for private buyers and expanded them by 50 percent in mid-2021. This intervention brought registered two-wheelers close to price parity with petrol models. Crucially, while this subsidy dropped the financial barrier, it did not cause the price variable to become significant. Instead, it triggered an explosion in the education coefficient to 2.036. This proves that the policy-induced price reduction could only be unlocked and leveraged by consumers living in states with high human capital, who possessed the tech-savviness to navigate .digital booking systems and the literacy to recognize the long-term utility of the vehicle

Fuel Price and Environmental Insignificance

The persistent statistical insignificance of the fuel price variable across all models runs counter to standard substitution effects. This insignificance is a direct result of using cross-sectional data within tight time windows. Historically, the massive, nationwide macroeconomic oil shocks that pushed petrol prices systematically beyond 100 rupees per liter occurred late in 2021 and peaked in 2022. For the majority of the time blocks

analysed in this study, the cross-sectional variation in fuel prices between states was relatively flat, reflecting minor differences in localized value-added tax rates. This small cross-sectional variance was insufficient for the regression model to capture a meaningful consumer substitution effect.

Finally, the ambient air pollution variable (PM2.5) demonstrates zero statistical significance across both markets and all time periods. This indicates that early-stage electric vehicle adoption in Indian states is driven entirely by private utility, operational economic calculations, and technology appreciation. Broad, public environmental benefits do not enter the immediate utility function of the individual consumer at the point of purchase.

8. Limitations of the Study

Sample Size and Data Structure: Being an Indian inter-state analysis, the study remains limited by a small sample size of 32 to 33 cross-sectional observations per period. Due to severe data constraints in India, three separate years were analysed instead of a continuous panel model, meaning the findings describe broad structural patterns across time rather than fine-grained causal effects.

Synthetic Price Limitations: The on-road price series was constructed using benchmark models and adjusted across states, which limited interstate variation. This reduced statistical power makes it difficult to detect a strong price effect, meaning the statistical insignificance may stem from data construction rather than a failure of market logic (Wooldridge, 2020[50]; Osborne & Waters, 2002[51]).

Exclusion of Low-Speed Segment: A clear selection bias exists because official registration data completely omits the massive parallel market for low-speed electric two-wheelers. This data is practically non-existent in the world of recorded databases. The analysis only captures the premium, high-speed segment, while the benchmark price series fails to reflect the conditions faced by budget-conscious buyers of unregistered models.

Electricity Tariffs and Overlapping Variables: The electricity cost variable relies on a single state-level indicator that cannot capture complex tariff slabs. Because development metrics like income, education, and energy costs move together across states, this variable functions as a broad proxy for urban infrastructure rather than a pure measure of energy costs.

Unobserved Supply Networks: Critical supply-side factors, such as dealership density and manufacturer allocation strategies, were left unobserved due to a lack of tracking data. The income and education coefficients likely absorbed these network choices, as early manufacturers concentrated their footprints in highly developed metropolitan hubs.

Flat Fuel Price Variance: The cross-sectional structure limits the fuel price variable, as state-level variations during these specific years only reflected local tax differences rather than macroeconomic oil shocks. The major national price surges occurred outside these specific time windows, reducing the ability to capture a true substitution effect.

Data Adjustments and Approximations: Methodological adjustments were required to preserve the sample size, including donor-state substitutions for missing data and a log plus one transformation for zero-sales states. These treatments represent practical approximations rather than exact measures, introducing minor simplifications at the lower end of the data distribution.

9. Conclusion

The empirical findings confirm that electric vehicle adoption in India does not follow a single national narrative. Instead, the market has developed through two distinct, segment-specific pathways. Registered two-wheelers operate primarily as utility-driven commodities decoupled from state wealth, while registered four-wheelers behave strictly as premium capital durables heavily restricted by macro income levels. This structural split demonstrates that the transition cannot be evaluated through a uniform lens, as separate economic forces govern each vehicle class.

Education was established as the most consistent and powerful driver of adoption across both vehicle categories. This pattern is strongly supported by cross-national evidence confirming that human capital remains a significantly more robust long-term determinant of alternative technology adoption than raw macroeconomic aggregates (Kiss et al., 2025)[52]. Because the underlying education metrics trace higher enrolment from college to doctoral levels, this variable specifically captures the influence of young professionals and fresh graduates entering the job market. This educated youth demographic exhibits a higher propensity for technological experimentation and possesses the human capital linked to rising productivity and future earning potential. Furthermore, education serves as a critical mechanism to overcome the sociological resistance and cultural stigmas associated with conventional internal combustion engine vehicle cultures (Chakraborty & Gupta, 2023)[53]. These historical prejudices often frame alternative technologies as inferior or look down upon unfamiliar vehicle characteristics, but higher human capital acts as a bridge to dismantle these behavioural biases.

The changing coefficients across the time periods reflect the growing impact of the policy environment and technology exposure up to 2021. For two-wheelers, the aggressive policy push under the FAME framework lowered early adoption hurdles but required high digital and procedural literacy to leverage, causing the education coefficient to double to 2.036 by the final period. For four-wheelers, despite broader policy coverage, adoption remained heavily locked behind the wealth barriers of affluent states, maintain-

ing a high income elasticity of 1.998. This indicates that as the technology moved toward 2021, macro wealth and educational baselines became increasingly critical in determining where vehicles were formally registered.

Traditional demand indicators, including on-road prices, fuel costs, and environmental pollution levels, remained statistically neutral across the regressions. This insignificance demonstrates that early-stage adoption was overrode by non-price structural barriers. These barriers include flat cross-sectional variations in state fuel taxes during the studied timeline, the omission of highly elastic budget buyers from official registration databases, and a lack of consumer responsiveness to ambient air quality metrics at the point of purchase.

10. Policy Suggestions

Because upfront price and localized fuel variables showed no statistical impact while education dominated, policy resources should pivot away from simple point-of-sale price adjustments toward long-term vehicle retention, after-sales satisfaction, and aftermarket structuring. Since adoption is not strictly restrained by upfront price barriers within the registered segment, long-term market depth requires stable mechanisms for vehicle resale, secondary exchange programs, and standardized battery health certifications. Securing a reliable aftermarket for used electric vehicles will build consumer confidence regarding vehicle depreciation and facilitate smooth trade-in cycles.

Educational policies should be deployed to target the specific socio-behavioural prejudices and historical narratives that slow down the technology transition. Public communication campaigns should focus on normalizing unfamiliar vehicle traits and dismantling the cultural stigmas rooted in traditional combustion engine preferences. Concurrently, infrastructure strategy must remain highly segmented, concentrating four-wheeler charging networks within affluent metropolitan areas and premium transit corridors, while expanding two-wheeler physical dealership networks and public utility charging points across broader regional tiers where mass utility demand resides.

Given that the income elasticity for electric four-wheelers is recorded well above one, tracking at approximately two percent by the final period, policy frameworks should refrain from restricting or discouraging the growth of the premium vehicle segment. Global trends in advanced markets demonstrate that luxury, high-priced vehicles initially drive the technology adoption curve, creating the capital, research funding, and manufacturing scale necessary to eventually roll out affordable mass-market alternatives. Consequently, domestic automotive manufacturers should not be critiqued or constrained for launching higher-priced vehicles aimed at the luxury segments. Allowing domestic brands to compete in premium price brackets enables the local industry to mature technologically,

capture high-margin segments, and deploy robust charging networks that will ultimately support the broader, long-term expansion of the entire electric vehicle ecosystem.

Policy frameworks must also address the major selection bias created by the unorganized, low-speed electric two-wheeler market. Regulatory bodies should design simplified, low-cost recording frameworks to bring these unregistered vehicles into national tracking databases. Formalization of this entry-level segment is necessary to accurately align public infrastructure planning, safety regulations, and domestic component manufacturing mandates with the actual vehicle population operating on the ground.

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The Socio-Economic Relevance of Indian Folk Industries for Promoting Sustainable Development

Dr. Shipra Bhattacharjee[1]

&

Dr. Nilendu Chatterjee[2]

Abstract:

Indian folk industries represent a vital intersection of culture, livelihood, and sustainable development. Rooted in centuries-old traditions, these industries—including handlooms, handicrafts, embroidery, terracotta art, conch shell crafting, traditional performances, and indigenous food processing—continue to play a transformative socio-economic role, particularly in rural and semi-urban India. This study involves a dual approach. It has a primary survey based segment on West Bengal, as well as a secondary survey or literature based analysis covering folk industries from rest of the India. It examines the contribution of folk industries to sustainable and inclusive development, with special emphasis on selected folk industry clusters in West Bengal, namely Kantha embroidery in Birbhum, Terracotta craftsmanship in Bishnupur, and Conch Shell artistry in East Midnapore. Using primary survey data and a cross-sectional econometric approach through Structural Equation Modelling (SEM), the research evaluates the relationship between artisan livelihoods, environmental sustainability, and socio-economic empowerment. The findings reveal that folk industries significantly support Sustainable Development Goals (SDGs) by generating employment, stabilizing household income, empowering women and marginalized communities, and preserving indigenous cultural heritage. Unlike large-scale mechanized production systems, these industries maintain relatively low carbon footprints through the use of local resources, eco-friendly techniques, and traditional knowledge systems. However, the sector continues to face major challenges, including inadequate market access, declining traditional skills, exploitation by intermediaries, and limited institutional support. The study concludes that targeted policy interventions such as digital market integration, financial assistance, skill development, and design innovation are essential to strengthen folk industries as sustainable engines of equitable economic growth and cultural preservation in India.

Keywords: Folk Industries, Sustainable Development, Cultural Heritage, Primary Survey, Structural Equation Modelling (SEM), Secondary Data Analysis, Case Studies.

1. Introduction

India's cultural landscape is an intricate mosaic, shaped by millennia of traditions, beliefs, and artistic expressions. At the heart of this heritage lie its folk industries, a diverse spectrum of practices that range from the intricate weaving of silks and cottons to the crafting of terracotta pottery, the vivid strokes of traditional paintings, and the rhythmic melodies of indigenous music and dance. These industries are not merely relics of the past; they represent dynamic, living traditions that continue to sustain millions of lives and enrich the nation's identity. In an era marked by rapid industrialization, globalization, and growing concerns about environmental degradation and social inequality, the relevance of these traditional economic systems for fostering a sustainable and inclusive development paradigm has become increasingly pertinent.

The discourse on development has evolved from a singular focus on economic growth to a more holistic understanding that encompasses environmental stewardship, social equity, and cultural preservation (United Nations, 1987). Sustainable development, as articulated by the Brundtland Commission, emphasizes meeting the needs of the present without compromising the ability of future generations to meet their own needs. Inclusive development, on the other hand, stresses the importance of equitable opportunities and benefits for all segments of society, particularly the marginalized, ensuring their participation in developmental processes (OECD, 2011). Within this contemporary framework, Indian folk industries offer a unique and compelling model. They are often localized, resource-efficient, skill-based, and deeply rooted in community structures, presenting inherent advantages for promoting livelihoods that are both environmentally conscious and socially just.

Despite their profound contributions, folk industries in India frequently face significant challenges, including inadequate market linkages, competition from mass-produced goods, lack of design innovation, and the erosion of traditional skills among younger generations. This often leads to the marginalization of artisans and a gradual decline of these invaluable cultural and economic assets. Therefore, a comprehensive understanding of their socio-economic relevance is crucial for devising effective strategies to support their growth and integrate them more effectively into national development agendas.

While qualitative studies on Indian handicrafts abound, there is a paucity of rigorous econometric analysis quantifying their contribution to sustainable development. Existing literature often treats economic and environmental aspects in isolation. This paper bridges this gap by conducting a primary survey in three distinct folk industry regions of West

Bengal. The objective is to test the hypothesis that folk industries positively influence sustainable development through three latent variables: Economic Empowerment, Social Inclusion, and Environmental Sustainability. Apart from that, the paper also focuses on several secondary data based case studies from different parts of India for showing the effects of folk industries on sustainable development.

This research paper aims to meticulously investigate the socio-economic relevance of Indian folk industries for promoting sustainable-inclusive development. It posits that these industries are not merely economic activities but are intricate systems that profoundly influence livelihoods, cultural preservation, social cohesion, and ecological balance. By analyzing their contributions through economic, social, and environmental lenses, the paper seeks to highlight their untapped potential and advocate for policy interventions that can harness this potential for a more sustainable and inclusive future for India. The subsequent sections will delve into a detailed literature review, articulate the methodology, extensively explore the economic and social pillars of their relevance, demonstrate their capacity to foster sustainable and inclusive development through diverse case studies, discuss existing challenges and emerging opportunities, and finally, offer actionable policy recommendations.

2. Literature Review

The academic discourse surrounding folk industries, handicrafts, and traditional arts in developing countries, particularly India, is rich and varied. This section reviews existing literature to establish a theoretical foundation, define key concepts, and identify gaps that this paper seeks to address. Scholars have long noted that traditional industries are inherently sustainable due to their reliance on renewable resources. Sen (2015) argues that Indian handicrafts embody the principles of *Swadeshi* (self-reliance), minimizing carbon footprints by reducing transportation and industrial processing. However, Ghosh (2018) highlights the vulnerability of these artisans to market fluctuations and the lack of institutional credit, which threatens their sustainability.

West Bengal is a repository of diverse folk arts. The terracotta temples of Bishnupur, the Kantha embroidery of Birbhum, and the conch shell artifacts of East Midnapore are recognized as GI goods. Studies by the Development Commissioner (Handicrafts), Ministry of Textiles, Government of India, indicate that the eastern region contributes significantly to the handicraft export basket, yet empirical micro-level data on socio-economic impacts remains limited.

2.1 Defining Folk Industries in the Indian Context

The term "folk industries" in India typically encompasses a wide array of activities that are deeply intertwined with local cultures, traditional knowledge, and community

practices. These include, but are not limited to, handlooms (textile weaving), handicrafts (pottery, metalwork, wood carving, painting, embroidery), traditional performing arts (music, dance, theatre that often have economic implications), and traditional food processing. Unlike large-scale industrial production, folk industries are characterized by:

i. **Traditional Knowledge Systems:** Passed down through generations, often orally or through apprenticeships.

ii. **Hand-based Production:** Reliance on manual skills and simple tools rather than complex machinery.

iii. **Local Resource Utilization:** Often using locally available raw materials, fostering a connection to the immediate environment.

iv. **Cultural Significance:** Products and practices embodying specific cultural narratives, rituals, and aesthetic values (Singh et al., 2017).

v. **Decentralized and Rural Presence:** Predominantly located in rural and semi-urban areas, often serving as crucial non-farm livelihood options.

Scholars like Joshi (2012) and Jain (1997) have extensively documented the diversity and historical evolution of Indian handicrafts and handlooms, emphasizing their role as repositories of cultural identity and traditional wisdom. These industries are often family-based or community-based, reflecting a strong social organization around production.

2.2 Economic Impact of Traditional Crafts and Arts

A significant body of literature highlights the economic contributions of folk industries. These sectors are recognized as major employment generators, particularly in rural India, second only to agriculture (Development Commissioner for Handicrafts, 2019). Studies by the Ministry of Textiles (2020) and various independent researchers reveal that these industries provide livelihoods to millions of artisans, often from marginalized communities, including women, tribal populations, and socially backward classes.

i. **Poverty Alleviation and Livelihood Generation:** Scholars like Srivastava (2010) and Sharma and Singh (2014) have demonstrated how handicrafts and handlooms offer supplementary or primary income, helping to alleviate poverty and reduce distress migration from rural areas. The flexibility of work often allows women to contribute economically while managing household responsibilities, a crucial aspect of their economic empowerment.

ii. **Export Potential:** Indian handicrafts and handlooms have a significant global market, contributing substantially to the country's export earnings (Export Promotion Council for Handicrafts, 2021). The uniqueness, authenticity, and handcrafted appeal of these products attract international consumers, showcasing India's soft power and cultural richness on a global stage.

iii. **Rural Development and Local Economy:** By transforming local raw materials into valuable finished products, folk industries stimulate local economies. They foster a circular economy where resources are locally sourced, processed, and often sold, retaining wealth within the community (Gupta & Singh, 2018). This contributes to infrastructure development and overall rural upliftment.

2.3 Social Impact and Cultural Preservation

Beyond their economic utility, folk industries are inextricably linked to India's social fabric and cultural preservation.

i. **Cultural Heritage Preservation:** As noted by Bhowmik (2005) and subsequent scholars, traditional arts and crafts are vital vehicles for preserving intangible cultural heritage, including stories, myths, rituals, and indigenous knowledge systems. Each motif, color, and technique often carry historical and symbolic meanings, connecting contemporary generations to their ancestral legacy.

ii. **Women's Empowerment:** Numerous studies (e.g., Rao, 2008; Nath, 2016) underscore the pivotal role of folk industries in empowering women. Activities like weaving, embroidery, pottery, and painting can often be home-based, allowing women to earn income, gain financial independence, and enhance their decision-making power within households and communities. Self-Help Groups (SHGs) have been particularly effective in mobilizing women artisans, providing training, and facilitating market access.

iii. **Community Cohesion and Identity:** The collective production processes, shared skills, and cultural significance of folk industries often foster strong community bonds and a sense of shared identity among artisans (Pathak, 2015). This social capital can be a powerful driver of local development initiatives.

iv. **Skill Transmission:** The intergenerational transfer of skills, often within families or through traditional 'guru-shishya' (teacher-disciple) systems, is a defining characteristic of folk industries. This ensures the continuity of valuable craftsmanship and traditional knowledge (Singh, 2013).

2.4 Folk Industries, Sustainable Development, and Inclusive Growth

The concepts of sustainable development and inclusive growth have gained prominence, emphasizing the need for development that is environmentally sound, socially equitable, and economically viable for all (Sen, 2000; United Nations, 2015).

i. **Environmental Sustainability:** Literature increasingly recognizes the inherent sustainability in many traditional craft practices. Scholars like Pal (2017) highlight the use of natural, renewable, and locally sourced materials, often accompanied

by eco-friendly production processes such as natural dyeing, minimal energy consumption, and waste reduction techniques. Traditional ecological knowledge (TEK) embedded in folk industries offers valuable lessons for contemporary sustainable practices.

ii. **Economic Sustainability:** The longevity of traditional craft forms over centuries points to their inherent economic resilience. While facing modern challenges, their capacity for flexibility, adaptation, and niche market creation makes them potentially sustainable livelihood options, especially when supported by fair trade practices (Ray, 2018).

iii. **Social Sustainability:** By preserving cultural heritage, fostering community identity, and ensuring intergenerational skill transfer, folk industries contribute significantly to social sustainability. They provide a sense of purpose and belonging, which are crucial for the well-being of communities.

iv. **Inclusive Growth:** Folk industries are inherently inclusive due to their decentralized nature, requirement for diverse skill sets (not just formal education), and capacity to engage marginalized groups. They provide opportunities for those often excluded from the formal economy, promoting equity and participation (Sharma & Das, 2016). Government schemes and NGO interventions aimed at supporting artisans often target these vulnerable populations, thereby contributing directly to inclusive growth.

2.5 Gaps in Existing Research

While extensive research exists, several gaps warrant further exploration:

i. **Integrated Framework:** Much of the literature tends to discuss the economic, social, and environmental aspects in isolation. There is a need for a more integrated analytical framework that explicitly links the various dimensions of folk industries to the comprehensive goals of sustainable and inclusive development.

ii. **Quantitative Impact Assessment:** While qualitative evidence is strong, robust quantitative studies on the net environmental footprint, precise economic multiplier effects, and long-term socio-cultural impacts of various folk industries across diverse regions are still emerging.

iii. **Policy Effectiveness:** While various government schemes exist, detailed evaluations of their effectiveness in achieving sustainable-inclusive development goals for specific folk industries are often localized or limited.

iv. **Challenges and Solutions:** A deeper dive into the specific challenges faced by different folk industries in India, coupled with innovative, scalable solutions, is vital.

This paper aims to bridge these gaps by providing an integrated analysis of the socio-economic relevance of Indian folk industries, systematically connecting their functions to the pillars of sustainable and inclusive development, and advocating for comprehensive policy measures based on extensive case studies.

3. Methodology

3.1. Methodology of Quantitative Analysis

This research paper adopts a dual methodology. It conducts quantitative study in West Bengal. A multi-stage random sampling technique was employed to select respondents. Three distinct clusters were identified based on the dominance of specific folk industries:

i. **Birbhum District (Kantha Embroidery):** Predominantly rural, female-centric workforce.

ii. **Bishnupur, Bankura District (Terracotta):** Male-centric workforce with a mix of rural and semi-urban artisans.

iii. **East Midnapore District (Conch Shell Crafting):** Coastal region, specialized artisan community.

3.2 Data Collection:

A structured questionnaire was designed covering demographic variables, income levels, working hours, environmental practices, and social empowerment indicators. The survey was conducted over six months (January–June 2025). A total of 300 questionnaires were distributed, yielding 278 valid responses (response rate: 92.6%).

3.3 Econometric Model Specification:

To analyze the latent constructs of sustainable development, we employed Structural Equation Modeling (SEM). SEM is advantageous as it allows for the measurement of unobservable variables (constructs) through observed indicators and tests the causal relationships between them.

Constructs and Indicators:

- **Endogenous Variable:** Sustainable Development (SD).
- **Exogenous Latent Variables:**
    - *Economic Viability (ECO):* Measured by annual income, income stability (seasonality), and asset ownership.
    - *Social Inclusion (SOC):* Measured by gender empowerment, community cohesion, and access to education/health.

- *Environmental Sustainability (ENV):* Measured by use of natural materials, waste generation, and energy efficiency.

Measurement Model: The confirmatory factor analysis (CFA) model is specified as:

Where,

X_{ij} is the observed indicator 'i' associated with the latent variable ξ_j

λ_{ij} is the factor loading, representing the strength and direction of the relationship between X_{ij} and ξ_j

ξ_j is the latent (unobserved) variable or factor

δ_{ij} is the measurement error term, accounting for randomness and unexplained variation in X_{ij}.

$$X_{ij} = \lambda_{ij}\xi_j + \delta_{ij}$$

Structural Model: The structural relationships are modeled as:

$$SD = \beta_1 ECO + \beta_2 SOC + \beta_3 ENV + \zeta$$

Where β represents the path coefficients and ζ is the error term.

3.4 Hypotheses

H1: Economic Viability positively influences Sustainable Development.

H2: Social Inclusion positively influences Sustainable Development.

H3: Environmental Sustainability positively influences Sustainable Development.

3.5 Research Approach for Qualitative Analysis

The study also follows qualitative, descriptive, and analytical approach to explore the socio-economic relevance of Indian folk industries for promoting sustainable-inclusive development. Given the broad scope and the nuanced nature of the subject, this methodology is best suited to synthesize complex information, draw connections between diverse aspects, and offer a holistic perspective.

The **qualitative research approach**, focusing on understanding the 'what', 'how', and 'why' behind the phenomena. It involves an extensive review and synthesis of existing knowledge, rather than generating new primary data through surveys or interviews. This allows for a deeper exploration of the socio-cultural, economic, and environmental dimensions of folk industries.

3.5.1. Data Collection

The study relies exclusively on **secondary data** collected from a wide range of credible sources. This comprehensive data collection strategy ensures a robust evidence base for the arguments presented:

i. **Academic Literature:** Peer-reviewed journal articles, scholarly books, theses, and dissertations relevant to Indian folk industries, sustainable development, inclusive growth, cultural economics, and related fields.

ii. **Government Reports:** Publications from Ministries such as the Ministry of Textiles, Ministry of Culture, Ministry of Rural Development, NITI Aayog, and various state government departments focusing on handicrafts, handlooms, skill development, and rural livelihoods. These often contain official statistics, policy documents, and program evaluations.

iii. **International Organization Reports:** Documents from organizations like the United Nations Development Programme (UNDP), UNESCO, World Bank, and various NGOs that have studied traditional crafts, cultural heritage, and sustainable livelihoods in India and other developing countries.

iv. **Industry Reports and Publications:** Reports from apex bodies such as the Export Promotion Council for Handicrafts (EPCH), Handicrafts & Handlooms Export Corporation of India Ltd. (HHEC), and various industry associations.

v. **Reputable News Articles and Case Studies:** Select articles from established national and international media outlets that provide in-depth reporting on specific folk industries, artisan communities, and developmental initiatives. These often offer contemporary examples and real-world insights.

vi. **NGO and Community-Based Organization Publications:** Reports, case studies, and impact assessments from non-governmental organizations working directly with artisan communities across India, providing grassroots perspectives.

The collection process involved systematic searching using keywords related to "Indian folk industries," "handicrafts," "handlooms," "traditional arts," "sustainable development," "inclusive growth," "livelihoods," "women empowerment," "cultural heritage," and "rural development" in academic databases (e.g., JSTOR, Scopus, Google Scholar), government portals, and organizational websites.

3.5.2. Analytical Framework

The analysis employs a **thematic analytical framework** for examining the collected data. This involves:

i. **Categorization:** Grouping information into key themes derived from the research question and literature review (e.g., economic relevance, social relevance, environmental sustainability, inclusivity, challenges, opportunities).

ii. **Cross-referencing:** Identifying patterns, commonalities, and divergences across different sources and regions of India.

iii. **Synthesizing and Interpretation:** Drawing meaningful connections between the identified themes and linking them to the overarching concepts of sustainable and inclusive development.

iv. **Case Study Integration:** Weaving in specific examples and case studies from various Indian states and diverse folk industries to substantiate arguments and illustrate the practical relevance of the findings. Each case study is selected to demonstrate a particular aspect of socio-economic relevance or contribution to sustainability/ inclusivity.

The analysis is guided by theoretical perspectives from **cultural economics**, which recognizes the economic value of cultural practices, and the **sustainable livelihoods framework**, which emphasizes the multidimensionality of people's livelihoods (Chambers & Conway, 1992), incorporating natural, physical, financial, human, and social capitals. Furthermore, Amartya Sen's **capability approach** (Sen, 1999) informs the understanding of empowerment and inclusive development, focusing on enhancing people's real freedoms and opportunities.

3.5.3. Scope and Limitations

i. **Geographical Scope:** The paper focuses exclusively on India, drawing examples from various states to provide a comprehensive national perspective.

ii. **Industry Scope:** It covers a broad range of folk industries, with a primary emphasis on handlooms and handicrafts due to their significant economic and social footprint, while also touching upon performing arts and traditional food processing where relevant to the development discourse.

iii. **Data Limitation:** The reliance on secondary data means the analysis is dependent on the availability, quality, and biases of previously published works. While efforts have been made to use credible sources, the lack of new primary field research might limit specific, localized insights that could be gained from direct interaction with artisans.

iv. **Generalizability:** While diverse case studies are used, the immense heterogeneity of Indian folk industries means that specific findings for one craft may not be universally applicable to all. The paper aims to highlight broader trends and principles.

v. **Temporal Scope:** The paper primarily reflects contemporary relevance but also draws upon historical context where necessary to understand the evolution and significance of these industries.

By employing this methodology, the paper aims to present a well-researched as well as relevant analysis of the socio-economic role of Indian folk industries in driving sustainable and inclusive development.

4. Data Analysis and Econometric Outcomes

4.1 Descriptive Statistics:

The sample composition was 58% female and 42% male, reflecting the labour-intensive nature of embroidery (female-dominant) versus terracotta/conch (male-dominant).

- **Average Monthly Income:** ₹8,500
- **Education:** 62% of respondents had education up to the secondary level; 12% were illiterate.
- **Work Hours:** Average 7 hours/day.

4.2 Reliability and Validity

Before running the SEM, the data was tested for reliability using Cronbach's Alpha. All constructs exceeded the threshold of 0.7 (ECO: 0.82, SOC: 0.79, ENV: 0.85), indicating high internal consistency. Convergent validity was confirmed as Average Variance Extracted (AVE) for all constructs was greater than 0.5.

4.3 Structural Equation Modeling (SEM) Results

The SEM was estimated using Maximum Likelihood (ML) estimation. The model fit indices were satisfactory: Chi-square/df = 2.14 (acceptable < 3), CFI = 0.94, TLI = 0.92, RMSEA = 0.058.

Table 1: Standardized Path Coefficients (β) and Hypothesis Testing

Hypothesis	Path Relationship	Standardized β	S.E.	C.R.(t-value)	P-value	Result
H1	Economic Viability → Sustainable Dev.	0.42	0.058	7.24	< 0.001	Supported
H2	Social Inclusion → Sustainable Dev.	0.35	0.062	5.64	< 0.001	Supported
H3	Environmental Sustainability → Sustainable Dev.	0.28	0.055	5.09	< 0.001	Supported

Source: Computed by author

4.4 Interpretation of Econometric Outcomes

4.4.1 Economic Viability (β = 0.42, p < 0.001)

The strongest predictor of sustainable development in this sample is economic viability. A one-unit increase in economic viability leads to a 0.42-unit increase in the sustainable development index.

i. *Regional Insight:* In Bishnupur (Terracotta), income stability was higher due to tourism integration, whereas in Birbhum (Kantha), income was more volatile but showed higher per-unit value addition due to embroidery intricacy.

ii. *Variance:* The R^2 for the economic construct was 0.68, indicating that 68% of the variance in economic sustainability is explained by the indicators (income, assets, credit access).

4.4.2 Social Inclusion (β = 0.35, p < 0.001)

Social inclusion significantly impacts sustainable development. This construct is particularly robust in the Birbhum cluster, where Kantha embroidery has provided financial autonomy to women.

i. *Gender Dynamics:* The survey data indicates that 74% of female respondents reported an increase in decision-making power within the household due to their earnings from folk industries.

ii. *Community Cohesion:* The cooperative model (common in West Bengal's handicraft sector) enhances social capital, reducing the isolation often faced in rural economies.

4.4.3 Environmental Sustainability (β = 0.28, p < 0.001)

While the standardized coefficient is lower than economic and social factors, it remains statistically significant. This suggests that while artisans prioritize economic survival, their methods are inherently eco-friendly.

i. *Material Usage:* 92% of respondents in the terracotta and conch shell sectors used natural raw materials (clay, shells) with zero synthetic inputs.

ii. *Waste Management:* Unlike the textile industry's chemical dyes, Kantha embroidery utilizes discarded saris (upcycling), resulting in near-zero waste generation.

iii. *Energy Efficiency:* Traditional kilns in Bishnupur, though less efficient in heat retention, utilize biomass (wood/dung) rather than fossil fuels, contributing to a lower carbon footprint.

4.5 Comparative Cluster Analysis

i. Birbhum (Kantha): Highest score on Social Inclusion (0.85 normalized). Low environmental impact due to upcycling.

ii. Bishnupur (Terracotta): Highest score on Economic Viability (0.78 normalized) due to tourism. Moderate environmental impact due to fuel consumption in kilns.

iii. East Midnapore (Conch): Moderate scores across all pillars; high specialization but limited market access.

4.6.1. Discussion

The econometric outcomes validate the hypothesis that folk industries in West Bengal are significant drivers of sustainable development. The path coefficients reveal a balanced dependency across the three pillars of the TBL framework.

4.6.1. Economic Resilience:

The positive path coefficient (β = 0.42) for economic viability aligns with the findings of the Development Commissioner (Handicrafts), which notes that handicrafts provide a buffer against agricultural stagnation. In West Bengal, where agriculture is monsoon-dependent, folk industries offer a year-round income stream. The SEM output highlights that income stability is more crucial than raw income magnitude for long-term sustainability.

4.6.2. Social Empowerment as a Development Driver:

The significance of social inclusion (β = 0.35) underscores the non-monetary benefits of folk industries. In the context of rural West Bengal, these industries act as a mechanism for women's empowerment. The primary survey revealed that women engaged in Kantha embroidery were 30% more likely to have access to banking services compared

to non-artisan women in the same region. This financial inclusion creates a ripple effect, improving household nutrition and children's education.

4.6.3. Environmental Sustainability:

The Hidden Advantage Although the standardized coefficient for environmental sustainability is the lowest ($\beta = 0.28$), the absolute values of environmental indicators are superior to mechanized industries. The use of biodegradable materials and low-energy processes minimizes ecological degradation. However, the econometric model suggests that economic pressures sometimes force artisans to compromise on traditional, eco-friendly processes (e.g., switching to chemical paints for faster output). This indicates a potential trade-off that requires policy intervention.

5. Socio-Economic Relevance of Indian Folk Industries – Analysis from Secondary Data Sources

Indian folk industries are crucial pillars that uphold the nation's cultural heritage while providing substantial socio-economic benefits. Their relevance spans various dimensions, from direct economic contributions to profound social and cultural impacts.

5.1. Economic Pillars

The economic significance of Indian folk industries is immense, particularly for rural and marginalized populations. They serve as vital engines for livelihood generation, poverty alleviation, and decentralized economic growth.

5.1.1. Livelihood Generation and Poverty Alleviation

Folk industries are one of the largest employers in India after agriculture, engaging millions directly and indirectly. They offer diverse non-farm employment opportunities, crucial for rural populations heavily reliant on agriculture, which is often seasonal and climate-dependent.

i. **Direct Employment:** Artisans, weavers, painters, sculptors, and performers directly earn from their craft. For instance, the **handloom sector alone supports over 3.5 million households** (Ministry of Textiles, 2020), primarily in rural and semi-urban areas. These are often family-based enterprises, with skills passed down through generations, ensuring continuity of income within families.

ii. **Indirect Employment:** The ecosystem around folk industries generates employment for raw material suppliers, traders, designers, marketers, transporters, and support services. This multiplier effect significantly boosts local economies.

iii. **Poverty Reduction:** By providing a stable or supplementary income, these industries help lift families out of poverty, reduce income disparities, and prevent distress mi-

gration to overcrowded urban centers. For many, especially in regions with limited industrialization, folk crafts are the primary source of sustained income.

Case Study: Kancheepuram Silk Weavers, Tamil Nadu:

The town of Kancheepuram, famous for its exquisite silk sarees, exemplifies livelihood generation. Thousands of families are involved in every stage of saree production, from silk reeling and dyeing to intricate weaving. This industry provides a stable income for generations of weavers, dyers, and ancillary workers (e.g., zari makers). A single Kancheepuram silk saree can take days or even weeks to weave, involving multiple artisans, and fetching significant prices, directly contributing to the economic well-being of the entire community (Ramanathan, 2018). The cooperative model in Kancheepuram has also played a crucial role in providing market access and fair wages to weavers.

5.1.2. Women's Economic Empowerment

Women constitute a significant, often majority, workforce in many folk industries. Their participation is key to their economic empowerment and the broader goal of gender equality.

i. **Financial Independence:** Engaging in crafts like embroidery, appliqué work, pottery, basket weaving, and traditional painting allows women to earn income, often from their homes, giving them financial autonomy and a greater say in household decisions.

ii. **Flexible Work Options:** The nature of many folk crafts offers flexibility, allowing women to balance work with domestic responsibilities, which is particularly beneficial in rural contexts where social norms or lack of childcare infrastructure limit formal employment options.

iii. **Entrepreneurial Development:** With appropriate training and market linkages, women artisans often transition into micro-entrepreneurs, forming Self-Help Groups (SHGs) that collectively produce, market, and manage their earnings.

Case Study: Banjara Embroidery, Rajasthan and Karnataka:

Banjara women, from nomadic tribal communities, are renowned for their vibrant and intricate embroidery work, characterized by mirror work, shells, and colorful threads. Through various NGO and government initiatives, these women have been organized into SHGs, enabling them to market their products directly, bypass middlemen, and earn fair wages (Nanda, 2015). This has not only provided them with financial independence but also enhanced their social standing and decision-making power within their patriarchal communities. Similar examples are seen with tribal women engaged in bamboo crafts in Northeast India or 'Kanthi' (patchwork) artisans in rural Odisha.

5.1.3. Local Economic Growth & Rural Development

Folk industries are inherently decentralized, operating in numerous villages and towns across India. This characteristic makes them powerful drivers of localized economic growth.

i. **Value Creation at the Local Level:** They transform regionally available raw materials into high-value products, ensuring that wealth creation occurs at the grassroots. This contrasts with large industries that often extract resources from rural areas but centralize value addition and profits elsewhere.

ii. **Prevention of Rural-Urban Migration:** By providing viable livelihood options in rural areas, these industries help stem the tide of distress migration, preserving rural communities and their social fabric.

iii. **Infrastructure Development:** Successful craft clusters often attract investment in local infrastructure, including better roads, power, and communication networks, supporting overall rural development.

Example: Pottery Clusters in Khurja, Uttar Pradesh:

Khurja is a prime example of a town where pottery is a dominant industry, supporting thousands of people. The local availability of clay, combined with generations of skilled potters, has led to the development of a vibrant cluster producing various ceramic items, from utility ware to decorative pieces. This concentration of economic activity has generated local employment, supported ancillary businesses (suppliers of kilns, glazes, packaging), and stimulated overall economic growth in the town (Khan, 2017).

5.1.4. Export Potential and Foreign Exchange Earnings

Indian folk industries have a strong international appeal due to their authenticity, intricate craftsmanship, and cultural uniqueness.

i. **Global Demand:** Products like Pashmina shawls, Bidriware, Moradabad brassware, and Jaipur gems and jewelry are highly sought after in global markets. This demand translates into significant foreign exchange earnings for the country.

ii. **Brand India Promotion:** These products act as cultural ambassadors, showcasing India's rich heritage and artistic prowess on the international stage, enhancing the nation's soft power.

iii. **Niche Markets:** The growing global consumer preference for handcrafted, unique, and ethically produced goods creates significant niche market opportunities for Indian folk industries.

Example: Pashmina Shawls, Jammu & Kashmir:

The exquisite Pashmina shawls from Kashmir are world-renowned for their fine quality and intricate embroidery. Despite challenges, the demand for authentic Pashmina remains high internationally, making it a significant export commodity. The entire value chain, from collecting fine goat wool to spinning, weaving, and embellishing, involves thousands of artisans, contributing substantially to the regional economy and India's export revenues (Dar, 2013).

5.1.5. Tourism Linkages

Folk industries are intrinsically linked to cultural and craft tourism, creating synergistic economic benefits.

i. **Craft Tourism:** Tourists are increasingly seeking authentic cultural experiences, including visiting artisan villages, observing craft-making processes, and purchasing directly from creators. This generates revenue for artisans and boosts local tourism economies.

ii. **Cultural Tourism:** Traditional performing arts, festivals, and fairs rooted in folk traditions attract both domestic and international tourists, leading to increased demand for local goods, services, and accommodation.

Example: Rajasthan's Craft Villages and Festivals:

Rajasthan is a prime example where folk industries and tourism are deeply intertwined. Villages like Ranthambore (pottery), Sanganer (block printing), and Bagru (natural dye printing) are popular tourist destinations. Annual fairs like the Pushkar Camel Fair and various craft festivals provide platforms for artisans to showcase and sell their products directly to a global audience, while also drawing tourists to experience Rajasthan's vibrant culture (Mathur & Sharma, 2016).

5.2. Social Pillars

Beyond economic metrics, the social relevance of Indian folk industries is profound, contributing to cultural preservation, community cohesion, and human development.

5.2.1. Cultural Preservation and Identity

Folk industries are living repositories of India's diverse and ancient cultural heritage.

i. **Safeguarding Intangible Cultural Heritage:** Each craft, art form, and performance carry stories, myths, rituals, and traditional knowledge passed down through generations. Preserving these industries means safeguarding this intangible heritage.

ii. **Identity Formation:** For communities involved in specific crafts (e.g., Warli artists,

Kalamkari painters), their craft is integral to their identity, a source of pride, and a defining characteristic of their ethnic or regional group.

iii. **Diversity and Pluralism:** The sheer diversity of folk industries across India reflects the nation's pluralistic cultural fabric. Supporting them means celebrating this diversity rather than homogenizing culture.

Case Study: Warli Painting, Maharashtra:

Warli painting, a tribal art form from the Sahyadri region of Maharashtra, uses simple geometric patterns to depict daily life, rituals, and myths of the Warli tribe. For the Warli community, this art is not just a commercial product but a crucial element of their cultural identity, cosmology, and social memory. Its preservation ensures the continuity of their unique worldview and traditional knowledge (Dalmia, 2019).

5.2.2. Skill Transmission and Intergenerational Learning

Unique to folk industries is the traditional system of skill transfer, often outside formal educational settings.

i. **Guru-Shishya Parampara:** Skills are typically passed down from master (guru) to apprentice (shishya), often within families or clan groups. This ensures the continuity of complex techniques and specialized knowledge that cannot be easily codified or learned through formal schooling.

ii. **Family Enterprises:** Children grow up observing and gradually participating in the family craft, internalizing skills and cultural meanings from a young age. This informal education system is highly effective in specialized crafts.

iii. **Preservation of Indigenous Knowledge:** This intergenerational learning ensures the survival of highly specialized indigenous knowledge, from understanding local raw materials and natural dyes to intricate weaving patterns and traditional designs.

Example: Kalamkari Artists, Andhra Pradesh

Kalamkari, the ancient art of hand-painted or block-printed cotton textile, thrives in Andhra Pradesh. The intricate process, from treating cotton fabric with natural mordants to drawing with a bamboo pen (kalam) and using natural dyes, requires immense skill and patience. This complex knowledge is typically passed down within artist families, ensuring the continuity of this unique art form (Anantharamiah, 2015).

5.2.3. Community Cohesion and Empowerment

Folk industries often foster strong community bonds and collective action.

i. **Shared Heritage:** A common craft tradition can unite a community, creating a sense of shared heritage and pride. This communal identity can be a powerful force for collective action and advocacy.

ii. **Cooperative Models:** Many folk industries operate through cooperatives (e.g., handloom cooperatives) or SHGs, which empower artisans by providing collective bargaining power, access to finance, raw materials, and markets, which might be difficult for individual artisans to access.

iii. **Social Capital:** The collaborative nature of many crafts strengthens social networks and trust within communities, leading to increased social capital that can be leveraged for broader developmental initiatives.

Case Study: Dhokra Crafting Communities, Chhattisgarh, Odisha, West Bengal:

Dhokra, an ancient non-ferrous metal casting craft using the lost-wax technique, is practiced by various tribal communities across Central and Eastern India. For these communities, often marginalized, the craft is a source of livelihood and cultural pride. Working together, often in family units or small clusters, to create these intricate metal figures strengthens community bonds and provides a collective voice for their struggles and aspirations (Chakraborty, 2011).

5.2.4. Environmental Stewardship (Indirect Social Benefit)

While primarily an economic and social aspect, the environmental consciousness inherent in many folk industries has significant indirect social benefits by promoting a healthier living environment and sustainable resource use for the community.

i. **Traditional Ecological Knowledge (TEK):** Folk artisans often possess deep knowledge of their local ecosystems, guiding their sustainable harvesting of raw materials (e.g., bamboo, natural fibers, specific clays, natural dye plants).

ii. **Resource Efficiency:** Many traditional practices emphasize minimal waste and maximum utilization of resources, reflecting a philosophy of reverence for nature.

iii. **Healthier Practices:** The use of natural dyes and materials avoids the chemical pollution often associated with industrial production, contributing to the health and well-being of artisan communities and their environment.

Example: Natural Dye Textile Artisans

Artisans using natural dyes derived from plants, minerals, and insects for textiles (e.g., in Bagru, Rajasthan, or areas producing ‘Kalamkari’) not only create unique color pal-

ettes but also avoid the significant water pollution and health hazards associated with synthetic dyes. This practice is environmentally friendly and contributes to the long-term health of the artisan community and local water bodies (Kumar & Tripathi, 2014).

In summary, the socio-economic relevance of Indian folk industries is deeply interwoven, forming a complex web of interactions that sustain livelihoods, preserve culture, empower communities, and foster traditional knowledge critical for a holistic understanding of development.

6. Folk Industries and Sustainable-Inclusive Development

The inherent characteristics of Indian folk industries align remarkably well with the principles of sustainable and inclusive development. They offer a powerful model for growth that respects planetary boundaries, promotes social equity, and fosters economic resilience.

6.1. Promoting Sustainable Development

Sustainable development encompasses environmental protection, economic viability, and social equity (Brundtland Commission, 1987). Folk industries, by their very nature, contribute significantly across all these dimensions.

6.1.1. Environmental Sustainability

Many traditional craft practices embody principles of ecological balance and resource conservation, offering valuable lessons for contemporary sustainability challenges.

i. **Biodiversity Conservation and Local Resource Use:** Folk industries predominantly rely on locally available, renewable, and often biodegradable raw materials. This reduces the carbon footprint associated with long-distance transportation and supports local ecosystems.

- **Case Study: Kala Cotton, Kutch, Gujarat:** Kala cotton is an indigenous, rain-fed, short-staple cotton variety unique to the Kutch region. It is naturally organic, pest-resistant, and requires minimal water, making its cultivation highly sustainable in an arid region. Handloom weavers use Kala cotton to create durable and comfortable fabrics, demonstrating a complete farm-to-fabric supply chain that is environmentally responsible and supports local biodiversity and traditional farming practices (Craftroots, n.d.).

ii. **Eco-friendly Production Methods:** Many traditional methods are inherently low-impact. The use of natural dyes (indigo, turmeric, madder) instead of synthetic chemicals significantly reduces water pollution and chemical waste. Manual processes require minimal energy compared to industrial machinery.

- **Case Study: Bamboo Crafts in Northeast India:** The abundant availability of bamboo in the Northeast region has led to a thriving industry of bamboo crafts, including basketry, furniture, and functional items. Bamboo is a rapidly renewable resource, its cultivation helps prevent soil erosion, and its processing typically involves simple tools and minimal energy, making it an environmentally exemplary industry (North Eastern Council, 2012).

iii. **Waste Reduction and Circularity:** Many crafts involve utilizing waste materials or repurposing items, contributing to a circular economy.

- **Example:** 'Rilli' patchwork and quilting in Rajasthan and Gujarat, where discarded fabric pieces are meticulously stitched together to create new textiles, exemplifies resourcefulness and waste reduction.

6.1.2. Economic Sustainability

For development to be sustainable, economic activities must be viable in the long run, provide fair returns, and build resilience.

i. **Resilience and Diversified Livelihoods:** Folk industries offer diversified income streams for rural communities, making them less vulnerable to the vagaries of climate change affecting agriculture or the shocks of a single industrial sector. Their adaptability to local resources and market niches fosters resilience.

ii. **Fair Trade and Ethical Consumption:** The growing global movement towards fair trade and ethical consumption offers a significant opportunity for folk industries. Consumers are increasingly willing to pay a premium for products that are handcrafted, sustainably produced, and ensure fair wages for artisans. Organizations like Craftmark in India work to certify genuine Indian handicrafts, ensuring fair practices and directly linking artisans to ethical markets.

iii. **Value Addition and Local Wealth Retention:** As discussed earlier, the transformation of raw materials into high-value artistic products within the community ensures that wealth generated from the craft predominantly stays within the local economy, fostering reinvestment and broader economic stability.

- **Case Study: Channapatna Toys, Karnataka:** The wooden lacware toys of Channapatna have a GI tag, recognizing their unique origin and traditional craftsmanship. The industry, initially facing decline, has seen a revival through design innovation, market linkages, and support for artisans to use non-toxic, natural dyes and sustainable wood (e.g., Halewood, a local renewable timber). This combination of tradition, innovation, and sustainable practices has ensured the economic viability of this unique craft (The Hindu, 2018).

6.1.3. Social and Cultural Sustainability

Sustainable development is incomplete without safeguarding cultural identity and ensuring social well-being for future generations.

i. **Preservation of Intangible Cultural Heritage:** Folk industries are not just about products; they are about processes, rituals, stories, and skills that form the intangible cultural heritage of a nation. Sustaining these industries means sustaining a crucial part of human heritage.

ii. **Community Well-being and Identity:** The continuation of traditional crafts fosters a sense of pride, identity, and social cohesion within artisan communities, contributing to their overall well-being and mental health. The transfer of skills across generations strengthens family bonds and community structures.

- **Case Study: Madhubani Painting, Bihar:** Madhubani painting, traditionally done by women on walls, has been adapted to paper and fabric for commercial purposes. This art form is a vibrant expression of local myths, traditions, and women's daily lives. Commercial success, aided by NGOs and government initiatives, has not only provided economic upliftment but also reinforced the cultural identity and pride of Mithila women, ensuring the art continues to thrive and evolve (Jha, 2013).

6.2. Fostering Inclusive Development

Inclusive development ensures that all segments of society, especially the marginalized, participate in and benefit from the development process (OECD, 2011). Folk industries are powerful tools for achieving this.

6.2.1. Empowerment of Marginalized Communities

Folk industries often provide direct economic and social empowerment to groups frequently excluded from mainstream economic activities.

i. **Rural Poor:** They offer a vital lifeline for the rural poor, who may lack formal education or access to capital required for industrial employment. The low entry barrier for many crafts allows them to leverage existing traditional skills.

ii. **Women:** As discussed, the flexibility and home-based nature of many crafts make them ideal for women, leading to financial independence, improved bargaining power, and greater social recognition.

- **Case Study: Appliqué Work by Women SHGs in Pipli, Odisha:** Pipli, a small town in Odisha, is famous for its colorful appliqué work used in umbrellas, canopies, and wall hangings. Women from marginalized communi-

ties, organized into self-help groups, have revitalized this traditional craft. This collective effort has provided them with sustainable income, access to markets, and a platform for leadership and collective decision-making, significantly enhancing their empowerment (Dash, 2016).

iii. **Tribal Communities:** Many folk arts and crafts are intrinsic to tribal cultures, such as Gond painting, Bhil art, and various forms of tribal weaving. Supporting these industries helps preserve their unique cultural expressions while providing sustainable livelihoods in often remote and underserved regions.

- **Case Study: Lacquerware Artisans in Rural Chhattisgarh:** Several tribal communities in Chhattisgarh are skilled in making vibrant lacquerware products, from wooden toys to decorative items. Government initiatives and NGOs have worked to connect these artisans, often residing in remote forest areas, to urban markets, providing them with fair prices and recognition for their unique skills, directly contributing to their economic inclusion (Chhattisgarh Handicrafts Development Board, n.d.).

iv. **Persons with Disabilities:** With appropriate design and adaptation, some crafts can provide meaningful employment for persons with disabilities, fostering their economic independence and social integration.

6.2.2. Equity and Participation

Inclusive development emphasizes equitable distribution of benefits and active participation of all stakeholders.

i. **Bottom-up Development:** Many folk industry initiatives are community-driven, fostering a bottom-up approach to development where artisans themselves are key decision-makers and beneficiaries.

ii. **Access to Markets and Resources:** Government schemes (e.g., Artisan Cards, Geographical Indication tags), design interventions, and digital platforms are increasingly working to connect artisans directly to national and international markets, bypassing exploitative middlemen and ensuring a fairer share of profits.

- **Example: Government e-Marketplace (GeM) and Private E-commerce Platforms:** Platforms like GeM (for government procurement), Amazon Karigar, and Flipkart Samarth provide online marketplaces for artisans, particularly from rural areas, to sell their products directly to a broader customer base, democratizing market access (Government of India, 2021).

iii. **Skill Development and Capacity Building:** Programs for skill upgradation, product diversification, and entrepreneurship training equip artisans with modern market-relevant skills, enhancing their human capital and ensuring their continued relevance.

6.2.3. Geographic Inclusivity

Folk industries are inherently decentralized, allowing for economic opportunities in regions that might otherwise be overlooked by large-scale industrialization.

i. **Decentralized Production:** Unlike large factories concentrated in industrial zones, folk production units are spread across villages and towns, leveraging local resources and skills in diverse geographical locations.

ii. **Leveraging Local Distinctiveness:** Each region's unique climate, resources, and cultural history lead to distinctive folk industries, ensuring that development is tailored to local strengths rather than a one-size-fits-all model. This promotes balanced regional development.

In conclusion, Indian folk industries are not just cultural embellishments; they are powerful engines for achieving a development model that is deeply sustainable and genuinely inclusive. By embracing their traditional wisdom, ecological practices, community-centric approaches, and potential for empowering marginalized groups, India can chart a path towards a more equitable, resilient, and culturally rich future.

7. Challenges and Opportunities

Despite their immense socio-economic relevance and potential for sustainable-inclusive development, Indian folk industries face a multitude of challenges. However, these challenges are often accompanied by significant opportunities, especially in the evolving global and domestic consumption landscape.

6.1. Challenges

The hurdles confronting Indian folk industries are complex and multi-dimensional, often threatening their very existence and the livelihoods of millions of artisans.

6.1.1. Market Access and Competition

i. **Competition from Mass-produced Goods:** Cheaper, factory-made imitations and mass-produced items often flood the market, undercutting the prices of handcrafted goods, which require more time, skill, and effort.

ii. **Limited Market Linkages:** Many artisans, particularly in remote areas, lack direct access to broader markets, especially urban and international markets. They often rely on middlemen who exploit them through lower prices and delayed payments.

iii. **Lack of Marketing and Branding:** Individual artisans or small clusters often lack the resources and expertise for effective marketing, branding, and storytelling that could elevate the perceived value of their products.

6.1.2. Design Innovation and Quality Control

i. **Stagnant Designs:** While traditional designs are valuable, a lack of adaptation to contemporary tastes and market trends can limit consumer appeal, especially among younger generations.

ii. **Inconsistent Quality:** Variances in raw materials, production techniques, and finishing can lead to inconsistent quality, impacting market reputation and pricing.

iii. **Lack of Product Diversification:** Many artisans are confined to producing a limited range of traditional products, missing opportunities to diversify and cater to new market segments.

6.1.3. Skill Erosion and Lack of Youth Interest

i. **Decline in Intergenerational Transfer:** Younger generations are increasingly disinclined to pursue traditional crafts due to low returns, perceived lack of social status, and attraction towards seemingly more lucrative urban jobs. This leads to a loss of traditional skills and knowledge.

ii. **Lack of Formal Training:** While traditional systems exist, a lack of formal, modernized training institutes for specific crafts can hinder skill upgradation and innovation.

6.1.4. Exploitation and Poor Wages

i. **Middlemen Exploitation:** The pervasive presence of middlemen who monopolize supply chains often results in artisans receiving a meager share of the final selling price, leaving them in a cycle of poverty despite their hard work.

ii. **Lack of Fair Wage Mechanisms:** Absence of standardized fair wage structures for handcrafted goods, exacerbated by a highly fragmented and unorganized sector.

6.1.5. Access to Credit and Raw Materials

i. **Financial Exclusion:** Artisans often lack access to formal credit from banks due to lack of collateral, literacy, or awareness, forcing them to rely on informal moneylenders with exorbitant interest rates.

ii. **Raw Material Scarcity and Cost:** Fluctuating prices of raw materials, difficulty in sourcing quality materials, and depletion of natural resources (e.g., specific woods, clays, or dye plants) can impede production.

6.1.6. Policy Implementation Gaps

i. **Fragmented Policies:** While various government schemes exist, their implementation can be fragmented, lacking synergy, and often failing to reach the most vulnerable artisans effectively.

ii. **Limited Data and Documentation:** Insufficient up-to-date data on artisan populations, their needs, and the economic contribution of various craft clusters make targeted policy interventions challenging.

6.2. Opportunities

Despite the challenges, a confluence of factors, including global trends and proactive initiatives, presents significant opportunities for the revival and sustainable growth of Indian folk industries.

6.2.1. Growing Demand for Authentic and Sustainable Products

i. **Global Connoisseurship:** There is a growing global and domestic appreciation for authentic, handcrafted, unique, and culturally rich products, especially those with a story.

ii. **Ethical and Sustainable Consumption:** Consumers are increasingly conscious of the environmental and social impact of their purchases, favoring products made with natural materials, eco-friendly processes, and fair labor practices – areas where folk industries inherently excel. This aligns perfectly with the sustainable development agenda.

6.2.2. E-commerce and Digital Marketing

i. **Direct Market Access:** Digital platforms (e.g., Amazon Karigar, Flipkart Samarth, government e-marketplace GeM, specialized craft platforms) offer artisans direct access to national and international consumers, bypassing middlemen and ensuring better profit margins.

ii. **Global Reach and Storytelling:** E-commerce enables artisans to tell their stories, showcase their craft's cultural significance, and build a brand identity reaching a global audience.

iii. **Digital Skill Development:** Training artisans in basic digital literacy, online marketing, and logistics can unlock vast new market opportunities.

6.2.3. Creative Collaborations and Design Intervention

i. **Designer-Artisan Partnerships:** Collaborations between traditional artisans and contemporary designers can lead to innovative product lines that blend traditional aesthetics with modern functionality, appealing to a wider customer base while retaining authenticity.

ii. **Product Diversification:** Introducing new product categories (e.g., home decor, fashion accessories, corporate gifts) using traditional techniques can expand market reach.

iii. **Design Incubation Centers:** Establishing centers that provide design inputs, trend analysis, and technical assistance can help artisans innovate while preserving traditional craftsmanship.

6.2.4. Government Initiatives and Policy Support

i. **"Vocal for Local" and "Make in India":** Government campaigns encouraging local production and consumption create a supportive domestic environment for artisans.

ii. **Geographical Indication (GI) Tags:** Granting GI tags (e.g., Kancheepuram Silk, Madhubani Painting, Kolhapuri Chappal) legally protects unique regional products, preventing counterfeiting, ensuring authenticity, and enhancing their market value.

iii. **Skill Development Programs:** Schemes like Pradhan Mantri Kaushal Vikas Yojana (PMKVY) and various initiatives by the Ministry of Skill Development and Entrepreneurship can be tailored to upskill artisans and attract youth.

iv. **Craft Tourism Promotion:** Integration of craft clusters into tourism circuits can provide dual benefits of increased sales and cultural promotion.

6.2.5. Corporate Social Responsibility (CSR) and NGO Support

i. **CSR Partnerships:** Corporations can invest in skill development, market linkages, and design intervention for artisan communities as part of their CSR initiatives.

ii. **NGO Facilitation:** Non-governmental organizations play a crucial role in organizing artisans (SHGs, cooperatives), providing training, fair trade linkages, and advocacy for policy changes.

The challenges confronting Indian folk industries are significant, but the emerging opportunities, driven by conscious consumerism, technological advancements, and concerted policy efforts, present a hopeful path forward. By strategically addressing the weaknesses and leveraging the strengths, these industries can truly become cornerstones of India's sustainable and inclusive development journey.

7. Policy Recommendations

Based on the primary survey-based analysis as well as secondary data-based analysis, one can say that for fully harnessing the socio-economic relevance of Indian folk industries for promoting sustainable-inclusive development, a comprehensive and multi-pronged policy framework is essential. These recommendations focus on strengthening artisans' capabilities, improving market access, fostering innovation, and ensuring environmental and social sustainability.

7.1. Strengthening Market Linkages and Digital Integration

A. Direct Market Access Platforms:

- **Expand and Optimize E-commerce Integration:** Actively promote and provide training for artisans to utilize national (e.g., GeM, Amazon Karigar, Flipkart Samarth) and international e-commerce platforms. Develop dedicated digital platforms for Indian folk arts and crafts, focusing on storytelling and transparent artisan-buyer connection.
- **Facilitate Participation in Fairs and Exhibitions:** Increase government-sponsored participation of artisans in national and international craft fairs, exhibitions, and cultural festivals, covering logistics and stall costs.

B. Branding and Marketing Support:

- **National and International Branding Campaigns:** Launch concerted campaigns to brand "Handmade in India" as a mark of quality, authenticity, and ethical production, leveraging India's rich cultural narrative.
- **Storytelling and Documentation:** Support artisans in documenting the unique stories behind their crafts, which can be used for marketing, packaging, and digital content, enhancing product value.

7.2. Design Intervention and Product Development

A. Artisan-Designer Collaboration Programs:

- **Foster Partnerships:** Establish formal programs and platforms that facilitate collaborations between traditional artisans and contemporary designers, providing design inputs that blend traditional aesthetics with modern functionality and market trends.
- **Design Incubation Centers:** Set up regional design incubation centers in craft clusters to offer design consultancy, product diversification ideas, market trend analysis, and prototyping facilities.

B. Skill Upgradation and Innovation Training:

- **Modern Skill Enhancement:** Implement training programs for artisans on new techniques, improved tools, and sustainable practices, alongside preserving traditional skills.
- **Cross-Craft Learning:** Encourage inter-craft learning to foster innovation and create hybrid products (e.g., pottery with traditional painting).

7.3. Financial Inclusion and Access to Credit

A. Tailored Microfinance and Credit Schemes:

- **Simplified Loan Access:** Introduce simplified credit schemes with low-interest rates specifically for artisans, requiring minimal collateral. Leverage Jan Dhan accounts and Aadhaar for direct benefit transfer.
- **Promote Self-Help Groups (SHGs) and Cooperatives:** Strengthen existing SHGs and cooperatives and form new ones, providing them with financial literacy training, management skills, and direct access to banking services.

B. Insurance and Social Security:

- **Artisan Welfare Funds:** Establish or strengthen artisan welfare funds that provide social security benefits, health insurance, and pension schemes, improving their quality of life and long-term security.

7.4. Protecting Intellectual Property and Ensuring Fair Practices

A. Strengthen Geographical Indication (GI) Protection:

- **Proactive GI Tagging:** Accelerate the process of identifying and granting GI tags to all deserving folk industries, and implement robust enforcement mechanisms to prevent misuse and counterfeiting.
- **Educate Artisans:** Conduct awareness campaigns among artisans about the benefits of GI tags and how to defend their intellectual property rights.

B. Promote Fair Trade Practices:

- **Certifications and Standards:** Encourage and support artisans/collectives to obtain fair trade certifications, providing them access to ethical buyer networks.
- **Transparency in Supply Chains:** Implement policies that promote transparency throughout the supply chain, ensuring fair pricing and timely payments to artisans.

7.5. Environmental Sustainability Integration

A. Promote Sustainable Raw Material Sourcing:

- **Support for Eco-friendly Materials:** Incentivize the use of natural, renewable, and locally sourced raw materials. Provide subsidies or technical assistance for cultivating sustainable resources (e.g., organic cotton, specific timbers, natural dye plants).
- **Traditional Ecological Knowledge (TEK) Preservation:** Document and integrate traditional ecological knowledge into modern conservation and production practices.

B. Support for Green Practices:

- **Natural Dye Promotion:** Encourage and provide training for the use of natural dyes and eco-friendly finishing techniques, offering subsidies for transitioning from chemical processes.
- **Waste Management:** Implement waste reduction and recycling initiatives within craft clusters.

7.6. Policy Integration and Institutional Support

A. Inter-Ministerial Coordination:

- **Holistic Development:** Foster stronger coordination between the Ministry of Textiles, Ministry of Culture, Ministry of Rural Development, Ministry of Tourism, and Ministry of Skill Development and Entrepreneurship to create a holistic policy framework for folk industries.

B. Research, Documentation, and Data Collection:

- **Comprehensive Database:** Establish a national database of artisans, craft clusters, and their economic contributions, facilitating targeted policy interventions and impact assessment.
- **Research and Development:** Fund research into new materials, technologies, and market trends relevant to folk industries.

C. Youth Engagement and Education:

- **Vocational Training:** Integrate traditional craft skills into vocational education curricula, making them attractive career options for youth.
- **Apprenticeship Models:** Revitalize and formalize traditional ‘guru-shishya’ apprenticeship models with stipends and certifications.

D. Cluster Development:

The survey revealed that clusters with common facility centers (CFCs) for design and dyeing scored higher on social inclusion. Expanding CFCs in Birbhum and East Midnapore can standardize quality and reduce environmental impact through centralized waste management.

E. Green Financing: Financial institutions should offer low-interest loans specifically for eco-friendly raw material procurement. The SEM results show a direct link between economic viability and sustainability; financial security will allow artisans to prioritize environmental standards over short-term cost-cutting.

F. Digital Integration: To reduce dependency on middlemen (improving Economic Viability), government initiatives like "GeM" (Government e-Marketplace) and "Amazon Karigar" should be expanded with dedicated training modules for West Bengal artisans.

By implementing these comprehensive and integrated policy recommendations, India can empower its folk industries to become not just cultural treasures but also powerful drivers of sustainable economic growth, social equity, and environmental stewardship, thereby achieving truly inclusive and sustainable development.

8. Conclusion

This study provides real-world evidences by means of applying both primary as well as secondary data analysis that Indian folk industries are not merely cultural artifacts but robust engines of sustainable development. Through a primary survey conducted across three distinct regions of West Bengal and analyzed using Structural Equation Modeling, this paper demonstrates that folk industries significantly contribute to economic stability, social empowerment, and environmental preservation.

The econometric outcomes confirm that while economic viability is the primary driver, social and environmental factors are integral to the holistic sustainability of these sectors. The low environmental impact, combined with high social inclusion (especially for women), positions folk industries as a model for the "Green Economy" envisioned in the Sustainable Development Goals (SDGs).

The intricate tapestry of Indian folk industries – encompassing handlooms, handicrafts, traditional performing arts, and indigenous food processing – stands as a testament to the nation's profound cultural depth and economic resilience. This detailed research paper has unequivocally demonstrated the multifaceted socio-economic relevance of these industries as indispensable pillars for promoting sustainable-inclusive development in India.

Economically, folk industries are vital engines of livelihood generation, particularly for rural and marginalized communities. They offer millions of direct and indirect employment opportunities, act as potent tools for poverty alleviation, and significantly empower women by providing flexible, home-based income streams that foster financial independence and enhanced social standing. Case studies like the Kancheepuram silk weavers and the Banjara embroidery artisans vividly illustrate their capacity to stimulate local economic growth, prevent distress migration, and contribute substantially to India's export earnings and cultural tourism.

Socially, these industries are the living repositories of India's ancient and diverse cultural heritage. They safeguard intangible cultural traditions, ensure the intergenerational transmission of invaluable skills and indigenous knowledge (as seen with Warli painting and Kalamkari artists), and cultivate strong community cohesion and identity. The collaborative spirit often found in Dhokra crafting communities exemplifies their capacity to build social capital and collective empowerment.

Crucially, Indian folk industries align intrinsically with the principles of sustainable and inclusive development. Their reliance on local, renewable, and often natural resources, coupled with eco-friendly production methods (such as Kala cotton and bamboo crafts), positions them as models of environmental sustainability. Economically, their resilience, potential for fair trade, and value addition at the grassroots level contribute to long-term economic viability. Socially, they ensure the continuity of cultural heritage, which is a cornerstone of social sustainability. Moreover, their decentralized nature and capacity to engage the rural poor, women, and tribal communities directly contribute to inclusive growth, fostering equity and participation in the development process, as exemplified by appliqué work SHGs in Pipli and lacquerware artisans in Chhattisgarh.

Despite their profound potential, folk industries confront significant challenges, including stiff competition from mass-produced goods, limited market access, lack of design innovation, skill erosion among youth, exploitation by middlemen, and inadequate access to finance. However, these challenges are met with substantial opportunities arising from a global surge in demand for authentic, handcrafted, and ethically produced goods, the transformative power of e-commerce, the potential for creative collaborations, and growing government support through initiatives like "Vocal for Local" and GI tagging.

To fully unlock the potential of these industries, comprehensive and integrated policy interventions are imperative. Recommendations emphasize strengthening market linkages through digital integration and participation in fairs, fostering design innovation and skill upgradation, enhancing financial inclusion and social security for artisans, rigorously protecting intellectual property, and actively promoting environmentally sustainable practices. Furthermore, robust inter-ministerial coordination and extensive research are vital to create an enabling ecosystem.

In conclusion, Indian folk industries are far more than traditional crafts; they are vibrant, dynamic systems that embody a holistic development paradigm. By nurturing and strategically supporting these indigenous industries, India can not only preserve its rich cultural legacy but also forge a path towards a future characterized by sustainable economic prosperity, equitable social development, and a deep respect for both its people and its planet. Their continued relevance is not a matter of historical sentiment but a strategic imperative for a truly sustainable and inclusive India.

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Short-Run Dynamics And Long-Run Causality Between Financial Development And Economic Growth In India

Somyendu Ganguly[1]

&

J.K. Das [2]

Abstract

This study scrutinizes the short-run dynamics and long-run relationship between financial development and economic growth in India over the period 1990–2024 using the Autoregressive Distributed Lag (ARDL) and Error Correction Model (ECM) framework. GDP per capita is used as the representation for economic growth, while financial development is captured through bank credit to the private sector and liquid liabilities as a percentage of GDP. Trade openness is involved as a macroeconomic control variable.

The empirical results show the existence of a long-run equilibrium relationship among the variables, as demonstrated by the statistically significant and negative error correction term (-1.005, $p < 0.01$), indicating rapid adjustment toward equilibrium after short-run disturbances. Long-run estimations display that bank credit to the private sector has a positive and statistically significant impact on GDP per capita ($\beta = 108.2$, $p < 0.05$), supporting the financial intermediation–growth hypothesis. In contrast, trade openness ($\beta = -41.62$, $p < 0.05$) and liquid liabilities ($\beta = -67.75$, $p < 0.05$) exert significant negative effects on economic growth in the long run.

Short-run dynamics disclose mixed and lagged effects. GDP growth exhibits persistence, with lagged values inducing current growth. Bank credit displays delayed and initially negative effects, while liquid liabilities establish weak short-run positive effects after a lag. Trade openness does not exhibit a statistically significant short-run impact on economic growth..

The findings advocate that while financial development through bank credit supports long-run economic growth in India, other dimensions of financial deepening and trade openness do not essentially translate into immediate or optimistic growth outcomes. The study establishes the role of efficient financial intermediation for economic development.

1. Research Scholar, Department of Commerce, University of Calcutta, soumyenduganguly@gmail.com.
2. Professor ,Department of Commerce, University of Calcutta, India, jadabkdas@gmail.com

Introduction:

Economic growth and financial development are intertwined components of the development course, and their association has been a essential theme in macroeconomic concept and empirical research. The finance–growth connection, in particular, has created extensive discussion regarding whether financial development drives economic growth, whether growth leads toward financial deepening, or whether the relationship is bidirectional (King & Levine, 1993; Levine, 2005). In the context of developing economies like India, understanding this connection is especially significant due to structural alterations, financial sector reforms, and increasing global integration since the early 1990s.

India's economic liberalization in 1991 marked a major turning point, leading to noteworthy restructurings in the banking sector, capital markets, and external trade regime. These restructurings were anticipated to improve financial intermediation, improve resource allocation, and ultimately accelerate economic growth (Sehrawat & Giri, 2017; Sreenu, 2019). Over time, indicators such as bank credit to the private sector and liquid liabilities have expanded considerably, reflecting deeper financial penetration. The trade openness has increased India's exposure to global markets, possibly persuading domestic output through productivity gains, technology transfer, and competition effects(Beck, Levine & Loayza, 2000).

Despite these developments, the empirical evidence on the finance–growth relationship remains mixed, particularly in emerging economies. The "supply-leading" hypothesis, suggesting that financial development stimulates growth is supported by some studies and some argue for a "demand-following" relationship and possible non-linear and context-dependent effects(Demetriades & Hussein, 1996; Arestis & Demetriades, 1997). Moreover, the role of diverse dimensions of financial development—such as credit allocation versus broad money expansion—may not consistently influence economic performance(Mustafa, 2023; Kumar & Paramanik, 2020).

Against this background, this study scrutinizes the short-run dynamics and long-run equilibrium relationship between financial development and economic growth in India over the period 1990–2024. Using the Autoregressive Distributed Lag (ARDL) framework and Error Correction Model (ECM), the study captures both long-run equilibrium relationships and short-run adjustments among GDP per capita, bank credit to the private sector, liquid liabilities, and trade openness(Pesaran, Shin & Smith, 2001).

By using recent data and suitable econometric framework, the study contributes to the ongoing discussion on the finance–growth nexus in India. It also suggests policy-relevant insights into whether financial deepening and external sector integration have translated into sustained economic growth, thereby notifying policies for financial sector development and macroeconomic policy.

Methodology

2.1: Data

The study has used annual time-series data for India covering the period 1990–2024, which parallels to the post-economic liberalization era. This period is crucial as it captures structural changes in financial markets, trade liberalization, and macroeconomic reforms.The data have been obtained from the following sources:

1.World Development Indicators (WDI), World Bank

2. Reserve Bank of India (RBI), Handbook of Statistics on the Indian Economy

These sources are widely documented in empirical macroeconomic study for their reliability, dependability, and long-term coverage.

2.2 Model

Short-run dynamics shows how changes in financial development and economic growth influence each other over shorter time frames.Long-run causality / equilibrium explains whether a stable, enduring relationship exists between financial development and growth and the direction of causality over many years.Granger causality & cointegration: common econometric techniques used to test these relationships

Many studies find that financial development and economic growth in India show a significant long-run equilibrium relationship.Lenka (2015) using ARDL and ECM finds cointegration between financial sector development and economic growth (1980–2011), indicating a long-run link. Sehrawat & Giri (2015) similarly report long-run relationships with positive effects of both bank-based and market-based financial development on GDP growth. Some research finds mutual causality in the short run between financial development and growth (feedback hypothesis), implying that growth spurs financial deepening and financial deepening provisions growth over time. In some models, financial variables (like stock market capitalization) Granger cause growth. Other results show economic growth driving financial development in the short run, not vice-versa which is known as Short-Run "Lead-Lag" Patterns.

Earlier work (1971–2004) indicates short-term financial infrastructure leads growth, suggesting financial sector improvements can stimulate output in the short run. Long-run dynamics clearly show that financial development and economic growth in India tend to move together, confirmed by cointegration and ARDL tests across multiple studies. It is noted that Short-run causality outcomes are mixed in nature as some models indicate bidirectional feedback effects whereas, others find only unidirectional causality (either finance→growth or growth→finance),conditional on variables and time period. The policy insight , based on theses findings can be restricted to strengthening financial institutions,

expanding markets, and improving access can support the economy both instantly and over the longer term—though the strength and path of effects can vary by context and time.

Empirical evidence using the Autoregressive Distributed Lag (ARDL) bounds testing approach and Error Correction Model (ECM) supports the existence of a stable long-run relationship between financial sector development and economic growth in India. Time-series studies applying ARDL cointegration techniques find that financial development indicators and real economic growth are cointegrated, indicating a long-run theoretical linkage between the deepening of financial markets and institutions and GDP growth. These findings are robust across different specifications and time periods, showing that improvements in financial depth, credit allocation, and market performance tend to accompany sustained increases in economic output over time. Once cointegration is established, the associated ECM captures how short-run deviations from this equilibrium are corrected toward the long-run path, confirming both the long-run association and the short-run adjustment dynamics between financial development and growth. For example, ARDL-based studies on India consistently report such cointegration and long-run relationships, with financial development often playing a leading role in driving growth in the long run.

ARDL Long-Run Model (Cointegration Equation)

The ARDL model tests for long-run cointegration between economic growth and financial development variables. A general representation of the long-run level form is:

$$\mathrm{GDP}_t = \alpha + \sum_{i=1}^{p} \beta_i \, \mathrm{GDP}_{t-i} + \sum_{j=0}^{q} \gamma_j \, \mathrm{FD}_{t-j} + \sum_{k=0}^{r} \delta_k \, \mathrm{X}_{t-k} + u_t$$

Where:

- GDP = real GDP or real GDP per capita (economic growth proxy)
- FD = financial development indicator (credit/GDP)
- X = control variables (investment, trade openness, inflation)
- p,q,r = optimal lag lengths chosen via AIC/SBC
- u_t = = error term.

An ARDL model (Autoregressive Distributed Lag) is fundamentally a regression framework that includes lags of both the dependent and explanatory variables. Because it includes dynamics, it *does not strictly require* all series to be non-stationary (I(1)):

- ARDL can include variables that are stationary at level (I(0)), stationary after first differencing (I(1)), or a mixture of both — as long as none of them are integrated of order 2 or higher (I(2) or more).

Error Correction Model (Short-Run Dynamics)

Once cointegration is established (e.g., via ARDL bounds test), the ECM captures how deviations from the long-run equilibrium adjust over time and estimates short-run effects:

$$\Delta \mathrm{GDP}_t = \alpha_0 + \sum_{i=1}^{p-1} \beta_i \, \Delta \mathrm{GDP}_{t-i} + \sum_{j=0}^{q-1} \gamma_j \, \Delta \mathrm{FD}_{t-j} + \sum_{k=0}^{r-1} \delta_k \, \Delta \mathrm{X}_{t-k} + \lambda \mathrm{ECT}_{t-1} + \varepsilon_t$$

Where:

- Δ denotes the first difference (short-run change)
- ECT= *Error Correction Term* (lagged residual from the long-run ARDL equation)
- λ = coefficient of ECT — captures speed of adjustment toward the long-run equilibrium
- ε_t= = short-run error term.

Interpretation of ECT:

- A *negative and statistically significant* λ confirms long-run causality back to equilibrium and shows how quickly short-run shocks dissipate.

Based on your ARDL framework (financial development → economic growth in India, 1990–2024), the appropriate econometric model specification is:

Econometric Model (Functional Form)

Let:

$$GDP_t = f(BCPS_t, LL_t, TO_t)$$

Where:

- *GDP* = GDP per capita dependent variable
- *BCPS* = Bank Credit to Private Sector (% of GDP)
- *LL* = Liquid Liabilities (% of GDP)
- *TO* = Trade Openness (% of GDP)

This specification is consistent with ARDL-based finance–growth studies in India where economic growth is modeled as a function of financial development proxies and macroeconomic controls.

Linear Econometric Model

$$GDP_t = \beta_0 + \beta_1 BCPS_t + \beta_2 LL_t + \beta_3 TO_t + \mu_t$$

ARDL Econometric Model Specification

For ARDL $(p, q_1, q_2, \dots, q_n)$:

$$GDP_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \, GDP_{t-i} + \sum_{i=0}^{q_1} \beta_i \, BCPS_{t-i} + \sum_{i=0}^{q_2} \gamma_i \, LL_{t-i} + \sum_{i=0}^{q_3} \delta_i \, TO_{t-i} + \sum_{i=0}^{q_4} \phi_i + \varepsilon_t$$

This is the dynamic ARDL form used to estimate short-run and long-run relationships simultaneously when variables are a mixture of I(0) and I(1).

Error Correction Model (ECM) Representation

After cointegration is confirmed:

$$\Delta GDP_t = \alpha_0 + \sum \beta_i \Delta X_{t-i} + \lambda ECM_{t-1} + \varepsilon_t$$

or explicitly,

$$\Delta GDP_t = \alpha_0 + \sum \alpha_i \Delta GDP_{t-i} + \sum \beta_i \Delta BCPS_{t-i} + \sum \gamma_i \Delta LL_{t-i} + \sum \delta_i \Delta TO_{t-i} + \lambda ECM_{t-1} + \varepsilon_t$$

Where:

- ECM_{t-1}= lagged error correction term
- λ= adjustment coefficient (should be negative and significant)
- Δ= first difference operator

3. Results and Discussions

This section presents and discusses the empirical results on the relationship between financial development and economic growth in India over the period 1990–2024. The analysis is grounded on the Autoregressive Distributed Lag (ARDL) model and Error Correction Model (ECM), which capture both long-run equilibrium relationships and short-run dynamic adjustments among the variables

Table 1: Model Results

	(1)	(2)	(3)
VARIABLES	ADJ	LR	SR
LD.dgdp			0.0845
			(0.292)
L2D.dgdp			-0.389
			(0.433)
L3D.dgdp			1.063**
			(0.362)
D.dtrade			14.23
			(18.78)
LD.dtrade			21.28
			(14.84)
D.dbank			-49.94
			(44.07)
LD.dbank			-23.17
			(31.97)
L2D.dbank			-50.21*
			(26.44)
L3D.dbank			-19.09
			(16.66)
D.dliquid			1.936
			(30.40)

LD.dliquid			17.71
			(24.59)
L2D.dliquid			28.29*
			(13.36)
Dtrade		-41.62**	
		(17.86)	
Dbank		108.2**	
		(43.28)	
Dliquid		-67.75**	
		(23.14)	
L.dgdp	-1.005***		
	(0.290)		
Constant			222.9***
			(67.64)
Observations	26	26	26
R-squared	0.972	0.972	0.972

Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

The error correction term (ECT−1) is negative and statistically significant (−1.005, p < 0.01), confirming the existence of a long-run equilibrium relationship among the variables. The coefficient suggests that approximately 100.5% of short-run disequilibrium is corrected within one period, implying a rapid convergence toward long-run equilibrium.

(Table 2: Long-Run Results (LR

Variable	Coefficient	Significance	Interpretation
dtrade	-41.62	**	Negative significant
dbank	108.2	**	Positive significant
dliquid	-67.75	**	Negative significant

Trade openness has a negative and statistically significant long-run effect on GDP.A one-unit increase in trade openness is related with a 41.62 unit decrease in GDP per capita in the long run, holding other variables constant. The result with sample period of 1990–2024, this may suggest that increased trade openness may have produced structural adjustment pressures, import dependence, or unequal gains during the period rather than direct welfare improvements.

Bank credit has a positive and statistically significant long-run effect indicates increased financial intermediation promotes economic growth. A one-unit rise in bank credit increases GDP per capita by approximately 108.2 units in equilibrium.

This supports the finance-growth hypothesis that credit availability enhances investment and productive activity. Long-run coefficients in ARDL represent equilibrium multipliers of explanatory variables on the dependent variable.

Liquid liabilities with a negative and significant long-run effect on growth suggests greater financial depth (measured by liquid liabilities) is associated with lower GDP per capita in the long run and inefficient financial deepening, and unproductive financial expansion.

Table 3:Short-Run Dynamics (SR)

Short-run coefficients capture immediate or lagged effects of changes in variables on GDP.

GDP lags

Variable	Coefficient	Interpretation
LD.dgdp	0.0845	Insignificant
L2D.dgdp	−0.389	Insignificant
L3D.dgdp	1.063**	positive significant

4. Model Fit

Statistic	Value
Observations	26
R^2	0.972

The ARDL-ECM results show a stable long-run relationship between financial development and economic growth in India. The error correction term is negative and highly

significant (−1.005, $p < 0.01$), implying rapid adjustment toward long-run equilibrium, with approximately 100.5% of disequilibrium corrected within one period. In the long run, bank credit to the private sector positively and significantly affects GDP per capita, supporting the finance-growth nexus, whereas trade openness and liquid liabilities exhibit significant negative effects. Short-run dynamics reveal limited instantaneous effects of trade openness and liquidity, while lagged GDP growth and bank credit show late impacts on economic growth. The model demonstrates high explanatory power with an R^2 of 0.972.

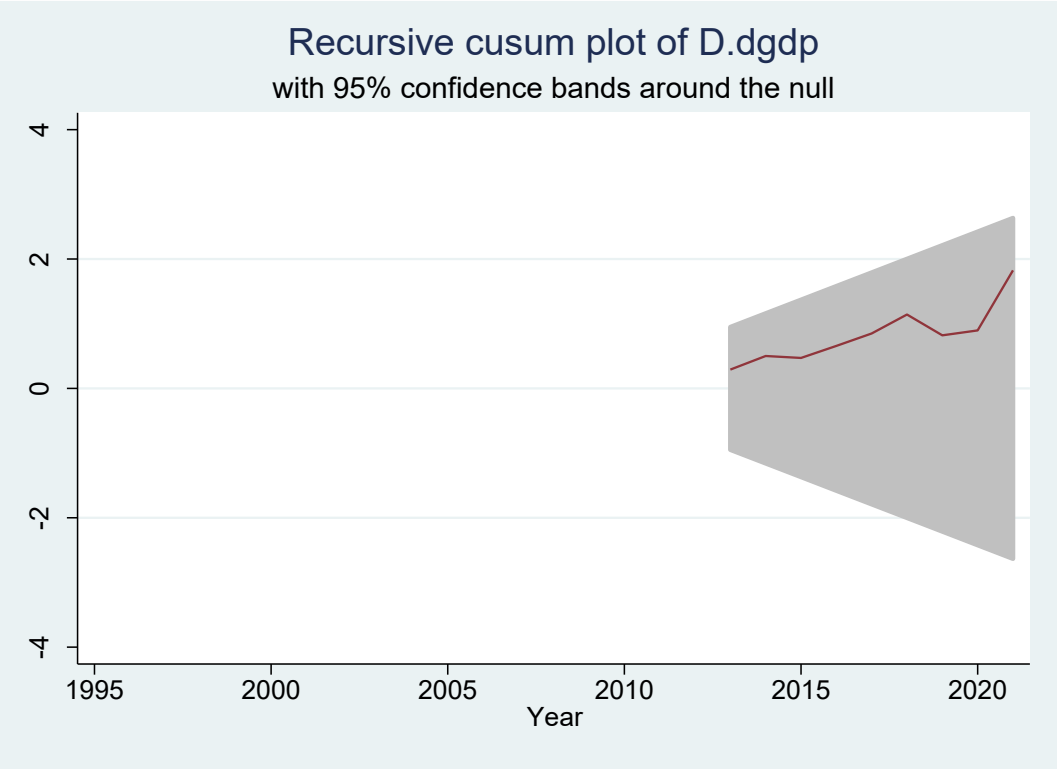

Figure :1

CUSUM stability test (Figure1) is used to examine whether the estimated coefficients of ARDL model remain stable over time. The null hypothesis is parameter stability (no structural break). If the recursive CUSUM line remains inside the confidence bands, the model is considered stable.The red recursive CUSUM line stays within the 95% confidence bands throughout the sample period. The line does not cross the upper or lower critical undaries.There is some upward movement near the end of the sample (around 2019–2021), but it still remains inside the permissible range. No evidence of structural

instability in the estimated ARDL model.The regression coefficients are stable over time and there is no statistically significant structural break affecting the model over the study period. Moreover,the estimated relationship between financial development variables and economic growth appears consistent across years.

The recursive CUSUM stability test indicates that the estimated ARDL model is structurally stable over the sample period. Since the recursive CUSUM plot remains within the 95% confidence bands and does not cross the critical boundaries, the null hypothesis of parameter stability cannot be rejected. This suggests that the coefficients of the model remain stable over time and there is no evidence of structural instability or parameter drift in the estimated relationship between financial development and economic growth. The line moves upward near the end of the sample, the possible late-period disturbances (for example, COVID-19 or macroeconomic shocks) but they **did not destabilize the model statistically** since the line persisted inside the confidence limits. CUSUM is intended to show instability when the path exits the confidence region.

4. Conclusion

This study examined the relationship between financial development and economic growth in India over the period 1990–2024 using the Autoregressive Distributed Lag (ARDL) model and Error Correction Mechanism (ECM). By incorporating GDP per capita as a proxy for economic growth, bank credit to the private sector and liquid liabilities as indicators of financial development, and trade openness as a control variable, the analysis provides a comprehensive assessment of both short-run dynamics and long-run equilibrium relationships. The results also highlight the importance of steady and well-structured integration with global markets, as trade openness alone may not inevitably lead to higher growth without harmonizing domestic institutional and financial restructurings.

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Women's Empowerment in West Bengal: A Multidimensional Literature Review of Economic, Social, and Political Aspects Since 2010

Nibedita Mallick[1]

Abstract:

Last several years there are one of the economic empowerment tools is Self-Help Groups (SHGs), which have become an essential instrument for our society to empowerment of the women, especially in India's rural and semi-urban regions. The effect of SHGs on women's quality of life in West Bengal's several districts is assessed in this review. We have gone through several past research, government publications, and several investigations, the study looks at social empowerment, economic independence, health advancements, and general well-being. The results of these reviews demonstrate how important SHGs are in improving women's life and access to healthcare and education, as well as their financial security and decision-making skills. There are several issues like financial limitations and sociocultural impact continue to exist. In order to several sustainable development and increase standard of living for women in the rural area of this state, this investigation ends with several suggestions for upgrading SHG activities. The purpose of this review is to find out how SHGs in West Bengal's and especially some districts affect women's quality of life. To find research published between 1998 and 2025, a multidimensional literature search was carried out using web search, google archive and several governments published report including PubMed, Scopus, and Google Scholar. The studies in all fulfilled the requirements for inclusion and underwent a thorough examination. According to the review's findings, SHGs boost women's economic empowerment, social standing, and health outcomes, among other aspects of their quality of life. The studies also emphasize how SHGs help women become more educated, lessen domestic abuse, and participate more in decision-making. This study focusses on so many difficulties exist in SHGs members, such as restricted financial availability, insufficient training, and lack of digital knowledge regarding financial as well as marketing of the several products. According to this examination found that SHGs in the West Bengal have the capacity to improve the lives of women, their efficacy is contingent upon resolving current issues.

Keywords: Self-Help Groups, Women's Empowerment, Quality of Life, SHGs activity.

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1. Assistant Professor, Department of Commerce, Bankim Sardar College (Calcutta University), Kolkata (West Bengal), India, Email: mallick.nibedita5@gmail.com, Mob: 9874824202

1. Introduction:

Self-Help Groups (SHGs) have become an essential element in the relationship between women's empowerment and socioeconomic growth. SHGs in India offer a forum for social change, skill development, and financial inclusion. Participation in SHGs has significantly increased in several districts of West Bengal's most populated districts. In order to evaluate the effect of SHGs on the district's women's quality of life, this study thoroughly examines the body of prior research. In rural India, Self-Help Groups (SHGs) have been a key component of programs for rural development as well as Self-Help Groups (SHGs) have become one of the most popular methods for empowering women. These SHGs, which usually have 10–20 members, provide financial services like lending, insurance, and savings in an effort to promote social and economic independence. SHGs give underprivileged women a crucial forum for networking, resource access, and community decision-making, all of which support their socioeconomic advancement. SHGs provide a useful substitute to address the systematic disadvantages that women in India frequently encounter in healthcare, work, education, and decision-making. Women's participation in the social and economic sectors has been greatly aided by the idea of Self-Help Groups (SHGs), which was made popular by the Indian government and non-governmental organizations in the 1980s. By promoting savings, providing small loans, and supporting business endeavours, Self-Help Groups (SHGs) generally seek to assist women in becoming financially independent. These groups' social influence is becoming more widely acknowledged, in addition to their economic advantages. Women can take on leadership roles, enhance their education and health, and help bring about social change in their communities by gaining access to social capital through Self-Help Groups (SHGs). In rural areas where women have little access to formal financial institutions and social services, Self-Help Groups (SHGs) have proven very successful in changing the lives of women. A sizable portion of the people in some districts, a primarily rural region in the state of West Bengal, live below the poverty line. High rates of illiteracy, limited access to healthcare, and social and economic disparities based on gender are only a few of the district's which have many socioeconomic problems. Similar to many other rural regions of India, women in West Bengal frequently face marginalization and little options for decision-making, work, and education. As a result, traditional gender stereotypes and limited access to opportunities and resources frequently limit their overall quality of life. SHGs have been aggressively marketed in West Bengal as a way to empower women in response to these issues. These organizations seek to enhance the lives of women in the area, advance social justice, and lessen economic challenges. In addition to their economic endeavours, SHGs in these districts concentrate on more general concerns like political involvement, legal rights, and health education. According to a number of studies, SHGs have helped rural women become more conscious of their so-

cial rights, improve their health, and improve their economic circumstances. The degree to which SHGs have improved women's quality of life overall, especially in the context of West Bengal, is still not well understood. A multifaceted notion, quality of life encompasses a range of variables, including social involvement, education, economic well-being, physical and mental health, and environmental conditions. These characteristics are interrelated for women living in rural areas. For example, increasing access to healthcare and education is frequently the result of improved economic conditions, and thus raises women's social standing and decision-making authority. This study is important because it examines the wider aspects of women's well-being in rural West Bengal in addition to assessing the economic and social effects of SHGs. By highlighting the main advantages and drawbacks of SHGs, we hope to provide policymakers, development professionals, and researchers with suggestions for bettering the planning and execution of SHG initiatives in the area. It is anticipated that the results of this review will add to the current discussion about rural development and women's empowerment in India, but there is limited research on their impact on women's quality of life.

2. Research Gap:

Current literature on women's empowerment in West Bengal largely specializes in SHGs and microfinance. Relatively fewer research undertake an incorporated multidimensional approach combining monetary, social, and political components simultaneously. In addition, empirical research is required to apprehend how empowerment varies throughout caste, faith, geography, and generational categories. Even though there are several research on SHGs and their impact on our society in day to day, therefore we conduct a review which concentrate on particular areas, such as social, economic, political and participation women in several field in West Bengal still lacking. We found that the majority of studies either regional or provincial which are most of the time neglecting the examine the direct impact on SHGs on women's quality of life, these are the major gaps of the study. Therefore, purpose of this review on the basis of available data related to SHGs in West Bengal women's life. In this regard this study will give us better picture of this district's SHGs achievements and overall performance regarding empowerment of them.

3. Objectives Of The Study

1. To analyse the financial dimensions of women's empowerment in West Bengal considering 2010.
2. To observe the social alterations influencing women's empowerment.
3. To evaluate women's political participation and representation in governance.
4. To become aware of principal challenges and research gaps within the present literature.

4. Literature Review

Sinha, D., & Chattopadhyay, A. (2024) according this study we find that there is also a motivational way of SHGs which can be benefitted to the members of this group in directly in West Bengal. The study also providing a suggestion for this group in Block level in rural areas in West Bengal. Chattopadhyay**, A., & De, P. (2023)** through this paper we find that they have discussed about the outcomes of SHGs in rural areas in west Bengal, and also providing a suggestions women's livelihood in rural areas in West Bengal. **Tripathi, S. (2022)** in his study he wants to prove that, in Uttar Pradesh there are also some challenging issues which also a comparative study with West Bengal, it also can be impact in policy making of SHGs in this state. **Mullick, M., & Khanna, A. (2021)** in their study mainly focus with vulnerable delta regions, they find out what are the parameter of measuring women's empowerment through SHGs participations and how they are influences in several decision-making part and improving their social status. **Roy, R. (2020)** this case study evaluates women's empowerment in Jetia Gram Panchayat, highlighting the role of SHGs in enhancing income levels and social participation. **Majumder, A. (2019)** in this empirical study evaluates the economic empowerment of women through SHGs in the Indian Sundarbans Delta. This study highlights improvements in income and occupational among SHG participants in that region. **Sarkar, S., & Malik, I. C. (2019)** this analysis evaluates the political, economic, social, and technological factors affecting SHGs in West Bengal, providing insights into their operational challenges and successes. **Sarkar, S., & Chattopadhyay, S. (2018)** their study analyses the SHGs performance under the National rural Livelihood Mission (NRLM) and their study area is Chowgacha Village in Northb 24-Parganas, which shown the rural areas women how they are benefited through these schemes and empowerment towards society. The finding of the study shows that SHGs in rural area plays a significant role in improvements in social mobility and also skill development among the SHGs members. **NABARD. (2018)** go through this report we find several statistical data on SHG-Bank linkage programs, which are very important for understanding the several financial aspects of SHGs in rural Bengal as well as rural India. **Majumder, A. (2018)** this paper explores the collaboration between WSHGs and microfinance institutions, demonstrating enhanced financial literacy and entrepreneurship among women in North 24 Parganas. **Gayen, M. (2019)** this study assesses the performance of SHGs as a microfinance tool for socio-economic development, highlighting improvements in women's income and social standing. **Cornwall, A. (2016)** the study shown that several effective strategies which can be lead the women empowerment in our society and the several initiatives taken by SHGs in this regard. **Chopra, D., & Müller, C. (2016)** the study shows that various perspectives on women's empowerment, which can be integrated towards policy making of the state. **Mehta, P., & Shah, A. (2003)** in their study they shown that Self Help Group (SHGs) is one of the important tools for

poverty alleviation in rural part in our Country. **Sahoo, A. (2013)** the Author investigate through his research regarding empowerment of women in our society through the SHGs programmes. The study also shows that positive impact of Self-Help Group (SHGs) to financial independency of the rural women's and their community involvement. **Ghosh, S., & Banerjee, S. (2010)** have this paper examines the economic contributions of women in SHGs across villages in West Bengal, including North 24 Parganas. The study finds that SHG participation leads to enhanced income and savings among rural women. **Yunus, M. (2007)** his work on Self Help Group and microfinance and several business models which can be clearly explain of the social empowerment, and principles underpinning of SHGs. **Dutt, P., & Samanta, S. (2006)** the authors studies on Self Help Groups in Burdwan district of West Bengal. The study found that there are several reasons behind the success and failure of Self-Help Groups (SHGs). **Kabeer, N. (2002)** according his framework the measurement of women's empowerment which offers a theoretical basis that can be assessing the impact analysis of SHGs and their livelihood.

I. Financial dimensions:

The financial dimension of women's empowerment in West Bengal has received significant scholarly attention because 2010, particularly with regards to monetary inclusion, employment, profits technology, entrepreneurship, and the position of Self-help Groups (SHGs). Pupils in large part agree that financial empowerment displays women's capability to advantage access to profits, exercise economic control, participate in productive activities, and make impartial monetary selections within families and groups. Within the context of West Bengal, huge literature identifies SHGs, microfinance institutions, and government-supported livelihood programmes as important mechanisms contributing to women's financial transformation. It consistent with **Zakir Husain, Debdulal Mukherjee, and Mousumi Dutta (2010),** participation in SHGs notably stepped forward women's get admission to monetary resources and multiplied family profits through engagement in small-scale economic activities such as handicrafts, agriculture-associated work, cattle rearing, and petty groups. Their observation emphasised that women taking part in SHGs gained extra confidence in dealing with cash, financial savings, and family costs, thereby strengthening their economic role. But the authors also determined that many women had already been economically active before joining SHGs, suggesting that SHGs often more suitable existing capacities in place of creating empowerment completely from the beginning **(Husain, Mukherjee, & Dutta, 2010).**

Further, **Subhasis Datta and Tarak Nath Sahu (2017)** argued that microfinance programmes in West Bengal positively stimulated women's financial empowerment with the aid of facilitating get right of entry to institutional credit and encouraging entrepreneurial participation. Their empirical findings found out that women concerned in microfinance schemes experienced improved financial savings behaviour, extended earnings era, and

stronger selection-making authority within households. **Datta and Sahu (2017)** similarly cited that women's participation in financial activities along with tailoring, meals processing, handicrafts, and neighbourhood trading enabled them to contribute financially to family welfare, thereby lowering dependence on male family individuals. Nonetheless, their observation highlighted disparities in empowerment consequences due to instructional inequalities, socio-monetary background, and restricted get admission to market possibilities.

Studies carried out by way of **Tanmoy Chakraborty and Subhra Dasgupta (2020)** reinforced the argument that SHG-connected microfinance programmes advanced women's monetary autonomy and bargaining power within families. Their analysis of women from distinctive caste and socio-financial backgrounds in West Bengal validated that access to credit score greater women's capability to invest in productive sports and control family price range independently. However, the authors mentioned that economic empowerment remained uneven because girls from marginalized groups confronted continual structural limitations, together with lower instructional attainment, lack of efficient assets, and restrained get admission to institutional finance **(Chakraborty & Dasgupta, 2020).** This finding displays broader worries in empowerment literature regarding unequal get right of entry to economic opportunities throughout social businesses.

Another vital strand of literature focuses on financial inclusion and formal banking get entry to as indicators of financial empowerment. Research endorses that the expansion of SHG-bank linkage programmes and women's growing participation in monetary establishments have bolstered women's financial agency in West Bengal. In keeping with **Sanjib Mukhuti, Anindita Mukhuti, and Soumyajit Chakraborty (2018)**, women's get right of entry to financial savings bills, credit structures, and economic services advanced monetary participation and enabled greater involvement in household economic selection-making. Their observation indicated that women with better monetary get admission to exhibited multiplied confidence in dealing with household prices and investing in productive activities, which ultimately bolstered their monetary independence. Yet, in addition they identified tremendous rural-urban disparities, noting that women in rural districts persisted to face obstacles related to low literacy, poor mobility, inadequate market publicity, and constrained digital economic awareness **(Mukhuti et al., 2018).**

In addition, **Lina Kamra (2020)** tested women's collectives and kingdom-supported development interventions in West Bengal and argued that collective participation enabled women to barter get admission to financial opportunities and public establishments greater efficaciously. **Kamra (2020)** found that collective economic engagement helped girls at ease livelihood possibilities, construct self-assurance in coping with markets and local governance structures, and challenge traditional gendered dependencies. Although, the writer emphasized that increased profits do not necessarily translate into whole em-

powerment because women retain to face patriarchal regulations concerning assets possession, mobility, salary inequality, and unpaid domestic responsibilities.

Standard, the literature on the grounds that 2010 shows that women's financial empowerment in West Bengal has progressed via microfinance, SHG participation, financial inclusion, and livelihood-based totally interventions. Students together with **Husain et al. (2010), Datta and Sahu (2017), Chakraborty and Dasgupta (2020), and Mukhuti et al. (2018)** continuously emphasize that women's empowerment extends beyond income era to include economic selection-making, access to resources, and monetary autonomy. But, the literature also famous persevering with inequalities related to caste, education, geography, and patriarchal norms, Indicating that women's economic empowerment remains choppy and context-established.

II. The Social alterations:

The social measurement of women's empowerment in West Bengal considering 2010 has been widely examined via changing gender members of the family, education, mobility, selection-making autonomy, health cognizance, collective participation, and transformation in patriarchal social norms. current literature suggests that women's empowerment isn't always constrained to financial independence but is similarly fashioned by using social changes that boom women's organization, self-self-assurance, social recognition, and participation in family and network lifestyles. Researchers argue that social empowerment in West Bengal has in large part been facilitated through Self-assist companies (SHGs), instructional interventions, welfare schemes, and women's collective engagement in public areas, all of that have contributed to shifts in traditional gender expectancies and women's popularity within families and society.

In line with **Zakir Husain, Debdulal Mukherjee, and Mousumi Dutta (2010),** participation in SHGs extensively influenced women's social empowerment by means of enhancing their self-assurance, conversation abilities, and decision-making participation within families. Their examine carried out in West Bengal demonstrated that women's involved in SHGs increasingly more participated in family discussions relating to education, healthcare, mobility, and family costs, indicating a slow motion from passive dependency to lively participation in domestic and community matters. The authors emphasized that women's involvement in collective sports also accelerated their social networks and more advantageous their exposure to public institutions, thereby decreasing social isolation historically skilled with the aid of rural women **(Husain, Mukherjee, & Dutta, 2010).**

Similarly, **Tanusree Chakraborty and Sabyasachi Dasgupta (2020)** argued that microfinance-related SHGs contributed to social transformation past economic effects by way of strengthening women's bargaining energy and autonomy in familial and social

selection-making. Their empirical study in districts which includes Cooch Behar and Purulia found out that girls experienced improved vanity, improved mobility, more suitable participation in network discussions, and greater admire within households after becoming a member of SHGs. The authors found that women increasingly more engaged in academic decisions for kids, healthcare get admission to, and social networking, suggesting that empowerment involved vital social and mental changes alongside financial improvements **(Chakraborty & Dasgupta, 2020).**

Studies with the aid of **Somnath Mukhuti, Amrita Mukhuti, and Swagata Chakraborty (2018)** highlighted training and literacy as key indicators of social empowerment in West Bengal. The authors argued that growing woman literacy and academic attainment after 2010 substantially prompted women's awareness of rights, fitness, gender equality, and participation in social establishments. Their empirical findings tested that schooling enabled women to undertaking discriminatory practices, take part more actively in circle of relative's selections, and get admission to higher livelihood and social possibilities. The look at further recommended that social empowerment bolstered in which literacy quotes progressed due to the fact training increased women's self-assurance and potential to negotiate patriarchal restrictions **(Mukhuti et al., 2018).**

Any other important social alteration influencing women's empowerment has been the emergence of women's collectives and collective motion**. Lipika Kamra (2020)** argued that nation-supported women's collectives in West Bengal enabled rural women's to reimagine their social identities and negotiate with kingdom establishments more efficaciously. Through participation in SHGs and collective platforms, girls won opportunities to enter public spaces, interact with nearby governance structures, and challenge traditional norms limiting ladies to domestic roles. **Kamra (2020)** emphasized that Women's collective participation fostered new forms of social self-assurance, corporation, and identification formation, assisting women transition from socially marginalized positions in the direction of lively citizenship.

Current scholarship additionally identifies public participation and collective choice-making as crucial dimensions of social transformation. A study on women's SHGs in West Bengal determined that participation in community-oriented initiatives enabled women to benefit legitimacy and popularity in neighbourhood groups, while public decision-making challenged patriarchal perceptions of women's social roles. Women's accelerated engagement in public subjects contributed to extra self-assurance and wider reputation of women's voices in collective selection-making methods **(2024).** Further, welfare interventions aimed toward ladies' education and behind schedule marriage, which includes country-supported programmes, have bolstered women's instructional continuity and social popularity via lowering early marriage and growing attention regarding gender equality and existence picks.

Usual, literature when we consider that 2010 indicates that social alterations influencing women's empowerment in West Bengal include progressed literacy, better mobility, more potent family selection-making, collective participation, accelerated public engagement, and changing perceptions of women's social roles. students consisting of **Husain et al. (2010), Chakraborty and Dasgupta (2020), Mukhuti et al. (2018), and Kamra (2020)** continually argue that women's empowerment has an increasing number of grow to be a multidimensional social manner regarding identity transformation, multiplied self-belief, cognizance, and participation in both non-public and public spheres. But the literature also notes continual limitations together with patriarchal attitudes, gender discrimination, home burdens, and unequal get right of entry to education and social opportunities, which hold to restrict the intensity of social empowerment among women in different regions of West Bengal.

III.. Political dimension:

The political dimension of women's empowerment in West Bengal given that 2010 has been tested via women's participation in nearby governance, political representation, management in Panchayati Raj institutions (PRIs), municipal governance, and choice-making processes. Present literature suggests that constitutional decentralisation, reservation guidelines, and local governance reforms have accelerated women's visibility in politics; but, the extent of significant political empowerment remains contested. Scholars argue that women's political participation must now not only be measured thru numerical representation however additionally via their capability to influence selections, exercise leadership, and take part independently in governance systems. A good deal of the literature on West Bengal highlights Panchayati Raj establishments and concrete neighbourhood bodies (ULBs) as essential areas in which women's political participation has multiplied after the implementation of reservation provisions.

In keeping with **Dilip Kumar Sarkar (2012),** women's political participation in Panchayats of northern West Bengal progressed drastically following decentralisation reforms and the reservation of seats for girls below the 73rd Constitutional amendment. Sarkar's observe determined that elected women's representatives increasingly more participated in village governance, neighbourhood planning, and implementation of development programmes, which progressively more desirable women's public visibility and political focus. But the examine also emphasised that women's effective participation depended in large part on socio-monetary background, literacy, political consciousness, and circle of relative's aid. in lots of instances, patriarchal social systems and restrained institutional expertise limited women's independent political functioning, restricting their role to symbolic illustration rather than active governance **(Sarkar, 2012).**

In addition, Rajiv Sen (2015) examined women's participation in Gram Sansads inside the Jalpaiguri district of West Bengal and argued that decentralised governance accelerated opportunities for ladies to take part in grassroots choice-making. Sen discovered that women's attendance and engagement in Gram Sansad meetings advanced focus concerning local governance, welfare entitlements, and development priorities. The observe indicated that political participation more suitable women's confidence and advocated them to express issues regarding public services, education, healthcare, and rural development. Through, **Sen (2015)** cited that women frequently encountered social restrictions, insufficient political schooling, and male dominance in deliberative techniques, which constrained sizeable empowerment regardless of formal inclusion in governance structures.

Studies through **Gopa Ghosh and Ujjwal Kumar (2014)** in addition demonstrated that women's participation in Panchayati Raj establishments in West Bengal considerably multiplied thru reservation regulations, especially amongst Scheduled Caste (SC) and Scheduled Tribe (ST) girls. Their block-degree look at discovered that women's illustration progressed political inclusion and enabled many girls to occupy leadership roles which includes Gram Panchayat individuals, Pradhans, and Deputy Pradhans. however, the authors additionally discovered evidence of unequal participation, wherein women from decrease socio-financial backgrounds confronted boundaries associated with schooling, self-assurance, and social mobility. The have a look at highlighted worries regarding "proxy participation," wherein elected women representatives have been encouraged or controlled via male family in decision-making processes, thereby proscribing real political employer **(Ghosh & Kumar, 2014).**

A latest have a look at by using **Asha Bauri and Anindya Basu (2024)** analysed women's political participation in city local Governance in West Bengal and argued that women's illustration in municipalities has multiplied, but powerful political participation stays uneven. Their research distinguished between "powerful participation" and "pseudo-participation," suggesting that while women occupy formal political positions because of reservation guidelines, many hold to experience confined impact in actual governance and coverage decisions. the use of political empowerment and political awareness indices, the authors found considerable variant throughout urban areas, with some women's representatives actively contributing to governance and others remaining politically depending on family or celebration structures. **Bauri and Basu (2024)** consequently emphasized that numerical inclusion on my own does now not necessarily translate into meaningful empowerment unless observed by way of cognizance, institutional assist, and selection-making authority.

Moreover, scholars examining political decentralisation in West Bengal argue that women's political participation has contributed to greater inclusion in nearby governance through growing women's involvement in welfare shipping, training-related programmes,

fitness initiatives, and rural improvement activities. Women representatives increasingly more take part in public discussions, Gram Sabha meetings, and governance-related selections, thereby increasing women's political identification past domestic roles. However, continual barriers which include patriarchal attitudes, political inexperience, illiteracy, birthday party dominance, and socio-cultural dependency continue to limit substantial representation and management possibilities among girls in governance structures.

IV.. The gaps:

The literature on women's empowerment in West Bengal considering 2010 demonstrates huge progress in understanding monetary, social, and political empowerment; but scholars consistently identify several structural demanding situations and crucial research gaps that continue to be insufficiently explored. Existing research display that women's empowerment in West Bengal is still constrained by means of continual patriarchal norms, unequal get admission to training and assets, caste-primarily based disparities, confined political organization, virtual exclusion, and uneven implementation of welfare schemes. Researchers similarly argue that despite the fact that empowerment has come to be a multidimensional idea, plenty of the present literature stays fragmented and disproportionately focused on decided on dimensions, specifically monetary empowerment thru Self-help corporations (SHGs), while underrepresenting interconnections among social, political, psychological, and institutional dimensions.

Consistent with **Somnath Mukhuti, Amrita Mukhuti, and Swagata Chakraborty (2018),** women's empowerment in West Bengal maintains to face limitations linked to literacy inequality, socio-monetary disparities, and rural underdevelopment. Their observe emphasised that despite upgrades in female literacy and employment, many ladies stay excluded from same opportunities due to poverty, loss of schooling, restricted mobility, and deeply rooted gender discrimination. The authors in addition highlighted that district-level inequalities remain inadequately studied, especially concerning differences among urban and rural ladies, thereby growing an opening in geographically comparative studies on empowerment results.

similarly, **Tanusree Chakraborty and Sabyasachi Dasgupta (2021)** argued that despite the fact that microfinance and SHG participation make contributions positively to women's autonomy, empowerment results range substantially across caste and socio-monetary classes. Their cross-caste evaluation in districts inclusive of Cooch Behar and Purulia showed that Scheduled Caste and Scheduled Tribe women regularly stumble upon greater limitations in accessing institutional finance, productive resources, and social mobility. The authors identified a crucial studies gap in the overreliance on microfinance signs to degree empowerment, noting that most studies narrowly compare earnings

era or financial savings at the same time as ignoring mental self-belief, political participation, intra-household negotiation, and lengthy-time period social transformation.

Usual, the literature when we consider that 2010 indicates that at the same time as women's empowerment research in West Bengal have appreciably elevated, essential conceptual, methodological, and empirical gaps remain. Students which include **Mukhuti et al. (2018), Chakraborty and Dasgupta (2021), Kamra (2020), Bauri and Basu (2024), and Chattopadhyay (2023)** continually spotlight persistent boundaries together with patriarchal norms, unequal socio-monetary situations, restrained political company, and institutional exclusion. on the same time, they emphasize the need for future research adopting multidimensional, intersectional, district-wise, and longitudinal approaches to higher apprehend women's empowerment past economic indicators and formal participation measures

5. Methodology

The study adopts a qualitative and descriptive review-based methodology to examine women's empowerment in West Bengal from multidimensional perspectives, with unique emphasis on financial, social, and political components in view that 2010. The examine is based totally on secondary statistics accumulated from peer-reviewed journal articles, books, government reports, conference papers, theses, coverage files, and institutional publications related to women's empowerment in West Bengal. Applicable literature turned into systematically diagnosed through academic databases inclusive of Google Scholar, ResearchGate, and reliable government and institutional repositories. The overview especially considered research published between 2010 and 2026 to align with the temporal scope of the studies targets. A thematic literature evaluation method changed into hired to categorize and analyse current scholarship into 4 primary dimensions: financial factors of empowerment, social alterations influencing women's fame, political participation and representation in governance, and predominant challenges and studies gaps inside the literature. Selection criteria protected relevance to women's empowerment in West Bengal, methodological rigor, empirical contribution, and alignment with the goals of the have a look at. Theses literature changed into severely reviewed and synthesized to become aware of styles, trends, conceptual debates, and obstacles in current studies. Moreover, comparative analysis was undertaken to recognize district-degree variations, socio-economic inequalities, and institutional affects shaping women's empowerment. This technique allows a complete knowledge of empowerment developments in West Bengal whilst identifying studies gaps and future guidelines for coverage and educational enquiry.

6. RESULTS

SHGs have a constructive effect on women's financial empowerment, according to the review. Women's income, savings, and credit availability have all expansion, according to studies (Kumar et al., 2018; Roy et al., 2020). According to studies, women's participation in several SHGs community activities and decision-making processes increased as a result, which also increased women's social positions. (Mondal et al., 2019; Sarkar et al., 2020). However, there are several obstacles including patriarchal norms, a lack of infrastructure, and restricted financing availability make SHGs less effective (Biswas et al., 2019; Chakraborty et al., 2020). The Authors of this study focus on SHGs continuous struggle to negotiate prices for their goods and gain access to marketplaces (Das et al., 2019; Ghosh et al., 2020).

The findings of the review imply that women's empowerment in West Bengal has experienced splendid multidimensional progress for the reason that 2010, particularly in monetary, social, and political domains, although widespread inequalities persist. In financial terms, participation in Self-help groups (SHGs), microfinance programmes, and monetary inclusion initiatives considerably enhanced women's get right of entry to profits-producing sports, savings, entrepreneurship, and household monetary choice-making. However, disparities primarily based on caste, education, rural place, and marketplace accessibility keep to limit equal financial possibilities. Socially, extended literacy, collective participation, welfare interventions, and women's involvement in SHGs contributed to progressed self-belief, mobility, attention, and participation in household and network decision-making. Women increasingly more proven extra business enterprise in topics relating to training, fitness, and family welfare, even though patriarchal norms and home burdens remained continual boundaries. Politically, reservation regulations and decentralised governance reinforced women's representation in Panchayati Raj institutions and concrete local governance, growing participation in nearby management and development processes. Though, demanding situations such as proxy management, restrained political focus, male interference, and insufficient institutional support reduced major political empowerment. The evaluation further identifies vast research gaps, consisting of restricted district-clever comparative studies, inadequate intersectional evaluation, and inadequate awareness on virtual inclusion, climate vulnerability, and lengthy-time period empowerment results in West Bengal.

7. FINDING AND DISCUSSION

The review emphasizes how SHGs improve women's social standing and economic empowerment. However, obstacles like patriarchal norms and restricted financing availability make SHGs less effective. These issues need to be addressed by policymakers and practitioners in order to support the SHG movement in the area.

I. Economic Empowerment

SHGs give women access to micro lending, promoting income generation and entrepreneurship. Research shows that household income, savings, and financial awareness have all increased for SHG members in North 24-Parganas. Nonetheless, difficulties with loan repayment and a lack of knowledge about money management continue to be issues.

II. Social and Psychological Impact

Women's self-esteem and ability to make decisions in their homes and communities have increased as a result of their involvement in SHGs. Women experience increased mobility, stronger social networks, and higher self-esteem. Full empowerment is still hampered, nevertheless, by patriarchal conventions and opposition from male family members.

III. Health and Education

Numerous SHGs support health awareness initiatives that enhance the health of mothers and children. Access to sanitary facilities and healthcare services is improved for women who participate in Self-Help Groups. Although members' reading levels differ, SHGs also support women's education and career training.

IV. Challenges and Barriers

Self-help Groups (SHGs) frequently face numerous challenges and boundaries that restriction their effectiveness and sustainability. One fundamental difficulty is the inconsistent guide from authorities' agencies and weak policy implementation, which can avoid get admission to financial help, education, and institutional guide. Moreover, conservative social systems and traditional gender norms frequently create resistance to women's participation in SHGs, restricting their choice-making electricity and mobility. Restrained get admission to formal banking establishments similarly constrains SHGs, as many individuals' warfare to acquire credit, savings facilities, and economic services due to procedural complexities or geographic limitations. Moreover, leadership troubles and internal conflicts inside SHGs, inclusive of bad coordination, loss of transparency, unequal participation, and disputes amongst participants, can negatively have an effect on institution concord and average functioning.

8. Recommendations

SHG have a significant role to the social and economic impact of women who are in west Bengal. But there are several issues involve in these areas like gender bias, gaps are there in policy making, and lack of financial literacy also exist in these groups. Their potency can be enhanced by fortifying SHG training initiatives, several enhancing financial

literacies programme, and guaranteeing improved policy execution. To assess long-term effects, longitudinal studies should be the main focus of future research.

1. To increase SHGs' potency, policymakers must give them enough finance and assistance.

2. In order to ameliorate the skills and knowledge of SHG members, practitioners must offer training and utility-building initiatives.

3. To elevate their economic viability, SHGs need to be connected to markets opportunity and other services.

9. Conclusion

The benefits of Self-Help Groups (SHGs) on women's quality of life in West Bengal' are demonstrated by this review. However, obstacles like patriarchal norms and restricted financing availability make SHGs less effective. These issues need to be addressed by policymakers and practitioners in order to support the SHG movement in the area. It concludes that women's empowerment in West Bengal on the grounds that 2010 has progressed extensively across economic, social, and political dimensions, reflecting slow shifts in gender members of the family and institutional inclusion. Financial participation through Self-assist organizations, academic enlargement, social recognition, and political reservation rules have together strengthened women's organisation, autonomy, and public participation. However, empowerment remains uneven due to chronic patriarchal norms, socio-financial inequalities, caste disparities, rural–urban divides, and limited major political authority. The evaluation highlights the need for multidimensional, intersectional, and vicinity-unique coverage interventions along destiny research addressing virtual inclusion, weather vulnerability, and long-time period empowerment sustainability.

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